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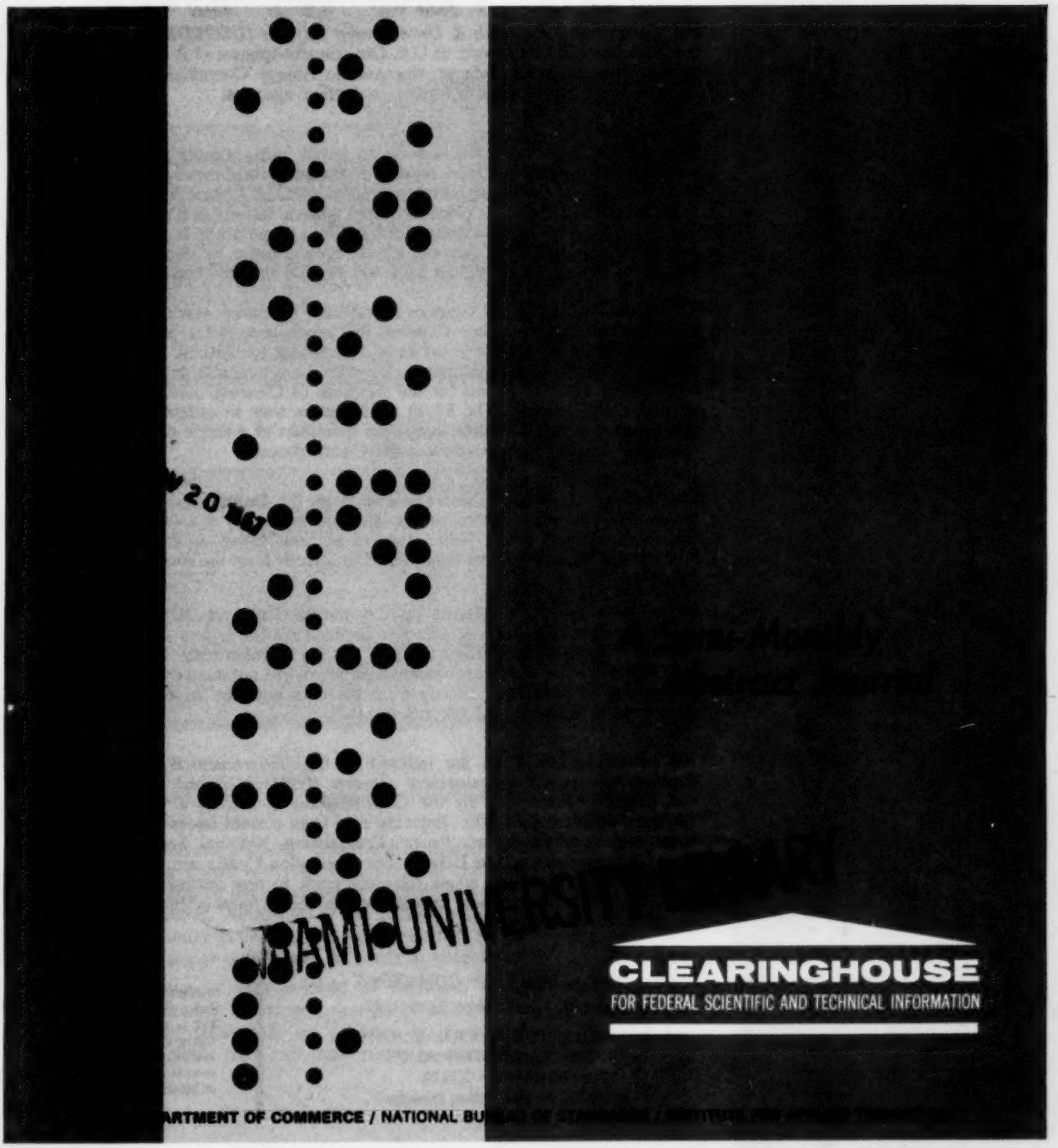
November 10, 1967

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $3.00. Indexing data from current issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
Alexander B. Trowbridge, Secretary

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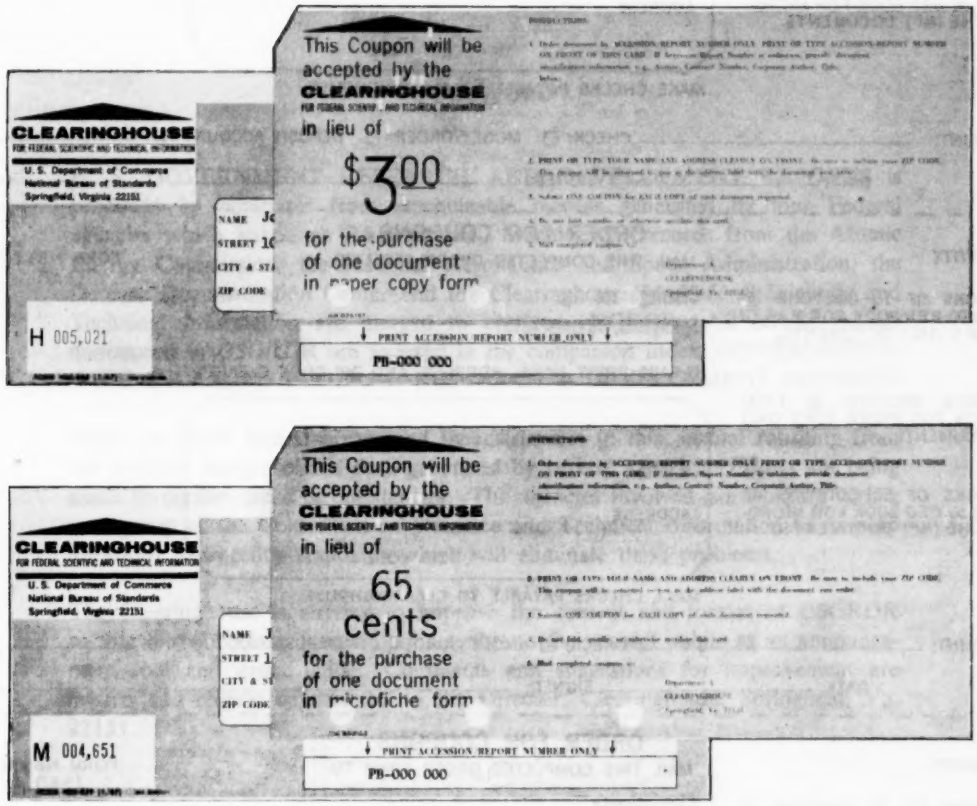

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FOREWORD

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is produced by computer from machineable records generated by four Federal agencies which announce R&D reports. Machineable records from the Atomic Energy Commission, the National Aeronautics and Space Administration, the Defense Documentation Center and the Clearinghouse for Federal Scientific and Technical Information are merged to produce USGRDR. All of the reports announced in USGRDR are indexed in the companion index, GOVERNMENT-WIDE INDEX TO FEDERAL RESEARCH & DEVELOPMENT REPORTS.

There are some format errors and inconsistencies in this journal resulting from the machine merger of the data generated by several agencies. Efforts are being made to correct these inconsistencies. The agencies involved are working with a task group of the Committee on Scientific and Technical Information to develop improved interagency standards which will eliminate these problems.

The Clearinghouse is striving to improve the content and format of USGRDR so that it will become increasingly valuable to the general public as an announcement tool and order guide. Comments and suggestions for improvement are invited and should be directed to the Director, Clearinghouse, Springfield, Va. 22151.

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Reports are announced under 22 subject categories called FIELDS. Each FIELD is divided into subcategories called GROUPS. Documents are listed alphanumerically by accession number within the GROUP. This classification system was adopted by the Committee on Scientific and Technical Information (COSATI). The *COSATI Subject Category List* (AD 612 200) is available from the Clearinghouse at $3.00.

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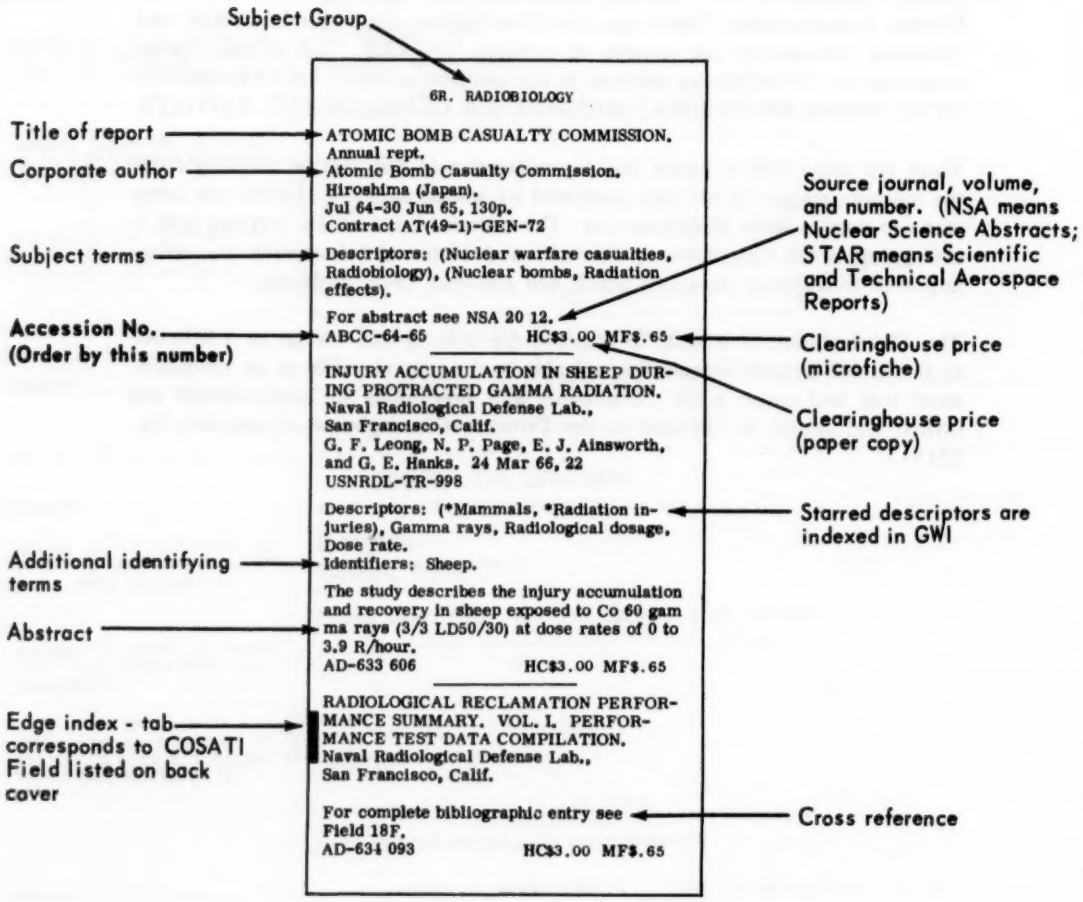
Subject Group
6R. RADIOBIOLOGY
Title of report
ATOMIC BOMB CASUALTY COMMISSION. Annual rept.
Corporate author
Atomic Bomb Casualty Commission. Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Subject terms
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
Source journal, volume, and number. (NSA means Nuclear Science Abstracts; STAR means Scientific and Technical Aerospace Reports)
For abstract see NSA 20 12.
Accession No. (Order by this number)
ABCC-64-65 HC$3.00 MF$.65
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INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION.
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Starred descriptors are indexed in GWI
Additional identifying terms
Identifiers: Sheep.
Abstract
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
Edge index - tab corresponds to COSATI Field listed on back cover
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION.
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
Cross reference
AD-634 093 HC$3.00 MF$.65

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SUBJECT CATEGORY HEADINGS

Use Edge Index on back cover to locate COSATI Field in journal

COSATI FIELD

01 AERONAUTICS

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive)

Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

11 MATERIALS

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear powerplants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition; electric propulsion; fuels; jet and gas turbine engines; nuclear propulsion; reciprocating engines; rocket motors and engines; and rocket propellants.

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents, unless otherwise designated, are sold at the new unit price of $3.00 each, 65 cents microfiche.

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Biological and Medical Sciences

THE CLOSE RELATIONSHIP OF SUBHUMAN PRIMATES TO MAN makes them the research animal of choice for much of the scientific investigation relating to man. Because of this close relationship, however, the subhuman primate is subject to the many diseases of man. This, coupled with the lower standards of hygiene and the prevalence of parasites and pathogens in the tropical countries that are the source of these animals, results in a research animal that is subject to many uncontrolled influences and may well be an explosive public health hazard.

On February 24, 1967, the regulations and standards of the Laboratory Animal Welfare Act, PL 89-544, were published in the Federal Register (Vol 32, No. 37, Part II). The rules govern animal dealers and research facilities, and apply to live dogs, cats, nonhuman primates, guinea pigs,

hamsters, and rabbits for use in research. The rules include the establishment of programs of disease control and prevention, euthanasia, and adequate veterinary care maintained under the supervision of a Doctor of Veterinary Medicine for all of the species listed.

To meet the challenge of these responsibilities of the veterinary profession, the veterinarian must acquaint himself with basic care, management, and disease problems associated with several species of animals he was not exposed to as a part of his curriculum in veterinary medicine. A guide has recently been published, however, in an attempt to provide the veterinarian with a broad familiarity with the subhuman primate and to provide references for more detailed requirements in specific areas. The guide contains chapters on the following topics: Primate Procurement; Housing and Care; Preventive Medicine and Public Health; Restraint, Anesthesia, Specimen Collection and Drug Administration; Nutrition and Vitamin Deficiencies; Generalized Infectious Diseases; Localized Infectious Diseases and Parasites; Physiological Data; Classification of Primates; Regional Primate Centers; and Suggested Library. ORDER. . . . . AD-657 570 -- THE SUBHUMAN PRIMATE, A GUIDE FOR THE VETERINARIAN. . . . . R. A. Whitney, Jr., et al., Medical Research Lab., Edgewood Arsenal, Md., June 67, 107p.

Fluid- and Aerodynamics

RESEARCH ON CONFINED FORCED VORTEX FLOW has been greatly intensified since the proposal of the cavity reactor concept for nuclear rocket propulsion in 1957 and the vortex magnetohydrodynamic (MHD) power generator in 1959. Although many types of vortex-like flow have been studied, the analysis of the characteristics of the gas-driven liquid vortex has been neglected.

In order to supply this information, an investigation of gas-driven two-phase vortex flow was conducted at the University of Michigan. Air and water were selected for analysis because of their great experimental flexibility. Since the cavity reactor and the vortex MHD generator provide the most immediate application for this type of flow, the following objectives, which are of major importance in these applications, were established: (1) Develop a suitable laboratory test facility, utilizing existing laboratory equipment, to provide visual observation techniques and standard measuring instruments. (2) Develop the necessary instrumentation and measuring techniques. (3) Determine the radial and axial distributions of pressure and density and determine the radial distribution of the velocity of both gas and liquid over a range of operating conditions. (4) Determine the effects of operating the

two-phase vortex in the presence of a radial magnetic field. (5) Correlate the measured parameters to characteristic system parameters. ORDER. . . . . PB-175 778 -- TWO-PHASE VORTEX FLOW. . . . . J. F. Lafferty et al., Michigan Univ., Ann Arbor, for the National Science Foundation, May 67, 171p.

Metalworking and Metal Forming

ELECTRO-CHEMICAL-MACHINING (ECM) has become an important manufacturing process during the past 20 years. The process has proven economically effective in drilling holes of various cross sections, die sinking, and contouring. Typical commercial ECM equipment operates in the vicinity of 15 VDC at current densities ranging from 100-200 amps/in^2 in die sinking to perhaps 2000 amps/in^2 in hole drilling. The volume rate of metal removal is directly proportional to total current, and the rate of tool advance is therefore directly proportional to current density. At typical current densities, the maximum feed rate (machining steel) is about 1/4 in/min. When machining tungsten carbide, the rate is approximately zero.

There are several possible mechanisms which limit the ECM rate. Excluding machine limitations, these mechanisms are: electrolyte boiling, electrolyte cavitation, hydrogen bubbles in the electrolyte, anode or cathode films, and electrode arcing. An investigation has recently been concluded which develops several methods for removing these ECM limitations. The physical actions used to alter the ECM process were: (1) high electrolyte velocity, (2) high electrolyte pressure in cutting zone, (3) high temperature (fused salt) electrolytes, (4) pulsed DC power, (5) elevated voltages, and (6) incidence of Laser energy upon the surface being machined. Of the mechanisms studied the three most promising were: elevated electrolyte pressure in the ECM zone which reduced boiling, cavitation, and the formation of hydrogen bubbles; the use of fused salt electrolytes; and pulsed DC current. ORDER. . . . . AD-659 004 -- INCREASING ELECTRO-CHEMICAL MACHINING RATES, FINAL REPORT. . . . . N. H. Cook et al., MIT, Cambridge, Mass., for the Army, Jan. 67, 124p.

Nuclear Technology

TRANSIENT ANALYSIS OF AN ENTIRE REACTOR PLANT is of importance both for studies of plant and reactor safety and for application to the design of plant components. The complete treatment of the effects

of plant transients, however, is impossible without a tool, such as a digital computer, capable of analyzing the behavior of the entire plant with speed, accuracy, and great detail.

A report recently published at the Los Alamos Scientific Laboratory describes such a digital computer program (RAPID) for the IBM 7094 computer. RAPID is intended for steady-state and transient analysis of an entire reactor plant; it treats core neutronics and heat transfer in core, reflector, primary loop, secondary loop, heat exchangers, heat dump, and piping; and it can be applied to a large number of plants, rather than one specific reactor plant. The report also contains the derivation of the mathematical and FORTRAN equations used and discusses the capabilities, limitations, and desired improvements of the system. ORDER. . . . . LA-3694 -- RAPID (REACTOR AND PLANT INTEGRATED DYNAMICS) COMPUTER PROGRAM. . . . . C. A. Anderson, Jr., Los Alamos Scientific Lab., Los Alamos, N. Mex., for the AEC, June 67, 184p.

Packaging and Containerization

A HANDBOOK OF DESIGN CRITERIA FOR MICROELECTRIC SYSTEM PACKAGES has recently been received by the Clearinghouse. Volume I is an introduction to the balance of the reports and a reference in clarifying unfamiliar terms. Volume II establishes a method of defining design requirements, defines a packaging design procedure, and describes the steps used in a packaging design evaluation. Volume IIIa contains reference material for use in implementing the procedures described in Volume II. Volume IV gives an illustration of the use of the procedures and design data contained in the other reports. ORDER:

AD-655 762 -- HANDBOOK OF DESIGN CRITERIA FOR MICRO-ELECTRIC SYSTEM PACKAGES: VOLUME I -- PACKAGING SYSTEM METHODOLOGY; VOLUME II -- PACKAGING SYSTEM DESIGN AND EVALUATION PROCEDURE, M. A. Merrigan, Hughes Aircraft Co., Fullerton, Calif., May 67, 180p.

AD-655 763 -- Same Title, VOLUME IIIa, DESIGN DATA, May 67, 183p.

AD-655 764 -- Same Title, VOLUME IIIb, DESIGN DATA, May 67, 384p.

AD-655 765 -- Same Title, VOLUME IV, DESIGN EXAMPLE, May 67, 67p.

Quality Control Standards, Specifications

A LISTING OF SPECIFICATIONS AND STANDARDS ORIGINATED BY NASA, its Centers, and the Jet Propulsion Laboratory through December 1966 has been published in an effort to help determine what specifications and standards had been generated, where they were developed, and which organization was responsible. The publication is divided into three sections: Section 1 is a listing of standards and specifications arranged according to the alpha-numeric designation assigned by the originating organization, Section 2 is a subject index, and Section 3 is an originator index. ORDER. . . . . N67-34727 -- NASA SPECIFICATIONS AND STANDARDS, Scientific and Technical Information Division, NASA, Washington, D. C., May 67, 380p.

Social Sciences and Education

A STUDY OF THE COMMUNIST INSURGENT INFRASTRUCTURE IN SOUTH VIETNAM is available from the Clearinghouse. Composed of two volumes, the work describes the infrastructure and concept of operation of the Communist-dominated insurgency in South Vietnam during the period 1954-1965, giving particular attention to matters of organization. Political, sociopsychological, and paramilitary factors are analyzed to determine their impact upon the strictly military aspects of the conflict. ORDER:

AD-655 506 -- THE COMMUNIST INSURGENT INFRASTRUCTURE IN SOUTH VIETNAM: A STUDY OF ORGANIZATION AND STRATEGY, VOLUME I, M. C. Conley, American Univ., Washington, D. C., for the Army, July 67, 244p.

AD-655 507 -- Same Title, APPENDICES, VOLUME II, July 67, 360p.

Testing, Analysis

THE MOLECULAR STRUCTURE OF A CHOLESTERIC LIQUID CRYSTAL is very delicately balanced and can be easily upset. Any small disturbance that interferes with the weak forces between the molecules can produce marked changes in such optical properties as reflection, transmission, birefringence, circular dichroism, optical activity, and color. The most

striking optical transformation that occurs in a cholesteric substance in response to subtle changes in environment is the variation of color with temperature. Most cholesteric substances are colorless as liquids; however, they pass through a series of bright colors when they are cooled through their liquid-crystal phase. It is this color response or change over the visible spectrum with temperature that has aroused interest in cholesteric liquid crystals as a possible nondestructive inspection tool.

A report recently prepared at the Naval Air Engineering Center in Philadelphia, Pennsylvania, describes the properties of cholesterol and three test techniques employing liquid crystals that have been used successfully for the inspection of certain aircraft structures and assemblies. ORDER. . . . . AD-659 189 -- LIQUID CRYSTALS AS A NONDESTRUCTIVE INSPECTION TOOL, FEASIBILITY STUDY. . . . . J. F. Erthal, Naval Air Engineering Center, Philadelphia, Pa., June 67, 49p.

RESEARCH & DEVELOPMENT REPORTS

1. AERONAUTICS

1A. Aerodynamics

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL ARICRAFT. VOLUME I. PROPELLER AND ROTOR AERODYNAMICS. HELD JUNE 22, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 562 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME II. PROPULSION AND INTERFERENCE AERODYNAMICS. HELD JUNE 23, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
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For primary bibliographic entry see Field 1C.
AD-657 563 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME III. AERODYNAMIC RESEARCH ON BOUNDARY LAYERS. HELD JUNE 24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 564 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME IV. PANELS ON RECOMMENDED V/STOL AERODYNAMIC RESEARCH, PANEL SUMMARIES, FEATURED SPEAKERS, AND TECHNICAL PAPER DISCUSSIONS. HELD JUNE 22-24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 565 HC$3.00 MF$0.65

DETERMINATION OF THE THERMAL ACCOMMODATION COEFFICIENTS OF GASES ON CLEAN SURFACES AT TEMPERATURES ABOVE 300K BY THE TEMPERATURE JUMP METHOD,
Missouri Univ Columbia Dept of Chemistry
For primary bibliographic entry see Field 20M.
AD-657 661 Not available from CFSTI.

EQUAL PRESSURE DIFFUSION AND GRAHAM'S LAW,
Maryland Univ College Park Inst for Molecular Physics
For primary bibliographic entry see Field 20D.
AD-657 719 Not available from CFSTI.

FURTHER EXPERIMENTAL RESULTS FOR THREE-DIMENSIONAL FREE JETS.
Polytechnic Inst of Brooklyn Farmingdale N Y
For primary bibliographic entry see Field 20D.
AD-657 723 Not available from CFSTI.

PLANAR FREE TURBULENT MIXING WITH AN AXIAL PRESSURE GRADIENT,
General Applied Science Labs Inc Westbury N Y
For primary bibliographic entry see Field 20D.
AD-657 725 Not available from CFSTI.

THE LAMINAR-BOUNDARY LAYER WITH LARGE PRESSURE GRADIENT AND SURFACE MASS TRANSFER,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 20D.
AD-657 749 HC$3.00 MF$0.65

RESTRICTED VARIATIONAL PRINCIPLE METHOD FOR THE PREDICTION OF LOW-DENSITY TRANSITIONAL REGIME CONE DRAG,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20D.
AD-657 767 HC$3.00 MF$0.65

AIR AND NITROGEN CONDENSATION IN HYPERSONIC NOZZLE FLOW,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-657 772 HC$3.00 MF$0.65

RESEARCH ON ADVANCED GASDYNAMICS TEST FACILITIES.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 14B.
AD-657 775 HC$3.00 MF$0.65

AN ANALYSIS OF THE INTERACTION OF A BOUNDARY LAYER AND THE CORNER-EXPANSION WAVE IN SUPERSONIC FLOW.
Toronto Univ (Ontario) Inst for Aerospace Studies
For primary bibliographic entry see Field 20D.
AD-657 780 HC$3.00 MF$0.65

THEORY OF GAS-SURFACE COLLISIONS,
Massachusetts Inst of Tech Cambridge Fluid Dynamics Research Lab
For primary bibliographic entry see Field 7D.
AD-657 795 HC$3.00 MF$0.65

TEST SECTION CONDITIONS FOR THE TAILORED INTERFACE HYPERSONIC SHOCK TUNNEL,
Sheffield Univ (England) Dept of Fuel Technology and Chemical Engineering
For primary bibliographic entry see Field 20D.
AD-657 796 HC$3.00 MF$0.65

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. I. THEORY FOR VARIABLE PROPERTY FLOW,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-657 919 Not available from CFSTI.

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. II. EXPERIMENTAL RESULTS AND COMPARISON WITH THEORY,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-657 920 Not available from CFSTI.

NOZZLE FLOWS WITH COUPLED VIBRATIONAL AND DISSOCIATIONAL NONEQUILIBRIUM,
Toronto Univ (Ontario) Inst for Aerospace Studies
For primary bibliographic entry see Field 20D.
AD-657 944 HC$3.00 MF$0.65

FLIGHTWORTHINESS AND RELIABILITY SUMMARY REPORT.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
For primary bibliographic entry see Field 1C.
AD-657 993 HC$3.00 MF$0.65

ON CONCAVE BODIES IN FREE MOLECULAR FLOW,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 20D.
AD-658 013 HC$3.00 MF$0.65

INTERACTION BETWEEN AN INSTRUMENT CAVITY AND A FLOW OF RAREFIED GAS.
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 20D.
AD-658 028 HC$3.00 MF$0.65

EFFECT OF A PROBE ON THE DRAG AND PRESSURE DISTRIBUTION OF A HEMISPHERICAL NOSE,
General Dynamics/Pomona Calif
For primary bibliographic entry see Field 16B.
AD-658 157 HC$3.00 MF$0.65

THE HIGH MACH NUMBER RAYLEIGH PROBLEM ACCORDING TO THE KROOK MODEL,
Columbia Univ New York
For primary bibliographic entry see Field 20D.
AD-658 254 Not available from CFSTI.

LINEAR THEORY OF ROTATING STRATIFIED FLUID MOTIONS,
Massachusetts Inst of Tech Cambridge Dept of Mathematics
For primary bibliographic entry see Field 20D.
AD-658 267 Not available from CFSTI.

THE INFLUENCE OF VIBRATIONS ON THE FLOW FIELD BEHIND A CYLINDER,
Boeing Scientific Research Labs Seattle Wash Flight Sciences Lab
For primary bibliographic entry see Field 20D.
AD-658 287 HC$3.00 MF$0.65

NONGRAY RADIATIVE TRANSFER EFFECTS ON THE RADIATING STAGNATION REGION SHOCK LAYER AND STAGNATION POINT HEAT TRANSFER,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20D.
AD-658 321 HC$3.00 MF$0.65

MEASUREMENTS OF HYPERSONIC TURBULENT HEAT TRANSFER ON A HIGHLY COOLED CONE,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20D.
AD-658 322 HC$3.00 MF$0.65

WIND TUNNEL TESTS EMPLOYING TEMPORAL AND SPATIAL VARIATIONS IN MASS TRANSFER DISTRIBUTION THROUGH A CONICAL SURFACE TO CONTROL AERODYNAMIC PITCHING MOMENT CHARACTERISTICS.
Fluidyne Engineering Corp Minneapolis Minn
For primary bibliographic entry see Field 20D.
AD-658 344 HC$3.00 MF$0.65

EFFECTS OF ABLATION ON THE PITCHING MOMENT DERIVATIVES OF CONES IN HYPERSONIC FLOW,
Fluidyne Engineering Corp Minneapolis Minn
For primary bibliographic entry see Field 20D.
AD-658 345 HC$3.00 MF$0.65

AN EXPERIMENTAL MODEL FOR THE SHARP LEADING EDGE PROBLEM IN RAREFIED HYPERSONIC FLOW,
Princeton Univ N J Gas Dynamics Lab
For primary bibliographic entry see Field 20D.
AD-658 390 HC$3.00 MF$0.65

Group 1A — Aerodynamics

A SENSITIVE MAGNETIC BALANCE FOR THE DIRECT MEASUREMENT OF SKIN FRICTION DRAG,
LTV Research Center, Dallas, Tex.
For primary bibliographic entry see Field 14B.
N64-19298 HC$3.00 MF$0.65

ON THE LAMINAR MOTION OF A FLUID NEAR AN OSCILLATING POROUS, INFINITE PLANE.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 20.
N67-34029 HC$3.00 MF$0.65

ON THE NON-LINEAR THEORY OF WINGS OF SMALL ASPECT RATIO.
K Nelineinoi Teorii Kryl'ev Malykh Udlinenii
Royal Aircraft Establishment, Farnborough (England).
S. D. Ermolenko. Mar 67, 22p RAE-LIB-TRANS-1218
Transl. Into English From Aviatsionnaya Tekhnika (USSR), V. 2, 1966 P 9-18

Descriptors: *Aerodynamic characteristics, *Low aspect ratio wing, *Rectangular wing, *Subsonic flow, Aerodynamic, Calculation, Characteristics, Drag, Flat, Flow, Lift, Low aspect, Moment, Nonlinear, Pitch, Ratio, Rectangle, Subsonic, Theory, Wing.

For abstract, see STAR 05 20.
N67-34099 HC$3.00 MF$0.65

PERFORMANCE OF THIN TURNING VANES IN SQUARE CONDUITS.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 20.
N67-34109 HC$3.00 MF$0.65

APPLICATION OF BLUNT TRAILING EDGE BLADINGS TO SUPERSONIC COMPRESSOR STAGES FINAL SCIENTIFIC REPORT, 30 APR. 1966 - 1 MAY 1967.
Von Karman Inst. for Fluid Dynamics, Rhode Saint-genese (Belgium).
For primary bibliographic entry see Field 21E.
For abstract, see STAR 05 20.
N67-34249 HC$3.00 MF$0.65

ESTIMATION OF SHEAR STRESS AND HEAT TRANSFER FOR NON-SIMILAR, LAMINAR BOUNDARY LAYERS.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
H. L. Evans. and A. B. Strong. Aug 67, 74p RR-2

Descriptors: *Boundary layer flow, *Heat transfer, *Shearing stress, Boundary, Circular, Cylinder, Drag, Ellipticity, Energy, Equation, Flat, Flow, Heat, Laminar, Layer, Plate, Shear, Stress, Temperature, Thermal, Transfer, Velocity.

For abstract, see STAR 05 20.
N67-34263 HC$3.00 MF$0.65

ON APPLYING FINITE ELEMENTS TO PANEL FLUTTER.
National Research Council of Canada, Ottawa (Ontario).
M. D. Olson. Mar 67, 26p LR-476, NRC-9642

Descriptors: *Approximation method, *Matrix stress calculation, *Panel flutter, *Stiff structure, *Supersonic flow, *Two-dimensional body, Analysis, Approximation, Body, Calculation, Deformation, Dimensional, Dynamic, Eigenvalue, Eigenvector, Element, Finite, Flow, Flutter, Matrix, Method, Mode, Numerical, Panel, Prediction, Stiffness, Stress, Structure, Supersonic, Theory, Two, Vibration.

For abstract, see STAR 05 20.
N67-34429 HC$3.00 MF$0.65

AN EVALUATION OF METHODS FOR PREDICTING THE PERFORMANCE OF PROPELLERS OPERATING AT ZERO ADVANCE RATIO.
Mcgill Univ., Montreal (Quebec). Mechanical Engineering Research Labs.
D. C. Gilmore. Apr 67, 62p TN-67-2
Contract DRB-G-9551-12

Descriptors: *Performance prediction, *Propeller efficiency, *Vtol, Advance, Analysis, Distribution, Efficiency, Evaluation, Forward, Grade, Method, Momentum, Performance, Power, Prediction, Propeller, Ratio, Speed, Strip, Theory, Thrust, Torque, Zero.

For abstract, see STAR 05 20.
N67-34494 HC$3.00 MF$0.65

SUBSONIC WIND TUNNEL WALL CORRECTIONS.
Advisory Group for Aerospace Research and Development, Paris (France).
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 20.
N67-34612 HC$3.00 MF$0.65

DESIGN OF A SUPERSONIC NOZZLE.
Aeronautical Research Council (Gt. Brit.)
A. Mc Cabe. 1967, 38p ARC-R+M-3440, ARC-25716
Refs

Descriptors: *Compressible flow, *Flow theory, *Supersonic nozzle, Angle, Axis, Compressible, Contour, Flow, Nozzle, Prandtl-meyer expansion, Supersonic, Theory, Throat.

For abstract, see STAR 05 20.
N67-34665 HC$3.00 MF$0.65

EXPERIMENTS AT MACH NUMBER EQUALS 4.03 ON TWO FAMILIES OF PRESSURE-PLOTTING WING AND HALF CONE COMBINATIONS.
Aeronautical Research Council (Gt. Brit.)
J. L. Attridge, J. Callinan, A. G. Mac Donald, and G. W. Rogers. 1967, 47p ARC-R+M-3473, NPL-AERO-1094

Descriptors: *Delta wing, *Flow field, *Lifting body, *Pressure distribution, Body, Delta, Distribution, Drag, Field, Flow, Interaction, Lifting, Pressure, Ratio, Size, Surface, Wing.

For abstract, see STAR 05 20.
N67-34692 HC$3.00 MF$0.65

TWO-DIMENSIONAL TURBULENT WALL JETS OVER CURVED SURFACES.
Mcgill Univ., Montreal (Quebec). Mechanical Engineering Research Lab.
D. E. Guitton. Feb 67, 60p MERL-TN-67-1, MERL-TN-64-7
Contract DRB-9551-12

Descriptors: *Curved surface, *Surface pressure, *Two-dimensional jet, *Wall jet, Decay, Dimensional, Distribution, Growth, Jet, Maximum, Perturbation, Pressure, Stress, Surface, Turbulence, Two, Velocity, Wall.

For abstract, see STAR 05 20.
N67-34701 HC$3.00 MF$0.65

DOUBLE-DRIVER SHOCK TUBE FOR SHOCK-ON- SHOCK SIMULATION.
Aeronautical Research Inst. of Sweden, Stockholm.
B. Lemcke. 1967, 92p FFA-109

Descriptors: *Shock simulator, *Supersonic flow, Blast, Body, Double, Driver, Flow, Interaction, Shock, Simulator, Supersonic, Tube

For abstract, see STAR 05 20.
N67-34803 HC$3.00 MF$0.65

A STATIC TEST RIG FOR THE MEASUREMENT OF THRUST EFFICIENCY AND DISCHARGE COEFFICIENT OF PROPELLING NOZZLE SYSTEMS.
Aircraft Research Association, Ltd., Bedford (England).
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 20.
N67-34839 HC$3.00 MF$0.65

A WIND-TUNNEL INVESTIGATION OF A 7-FOOT- DIAMETER DUCTED PROPELLER.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
B. Gamse, and K. W. Mort. Aug 67, 42p NASA-TN-D-4142
Contract 721-03-00-05-00-21

Descriptors: *Aerodynamic characteristics, *Ducted body, *Propeller, Aerodynamic, Angle, Angle of attack, Blade, Body, Boundary, Characteristics, Distribution, Downstream, Duct, Efficiency, Free, Lip, Power, Pressure, Propulsion, Stall, Stream, Upstream, Velocity.

For abstract, see STAR 05 20.
N67-34883 HC$3.00 MF$0.65

THE AERODYNAMIC PROBLEMS OF THE SOUNDING- ROCKET VEHICLES.
les Problemes Aerodynamiques des Fusees Sondes
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
R. Ceresuela. 1967, 28p ONERA-TP-441/1967/ in English and French Presented At the A.I.A.A. Sounding-rocket Vehicle Technol. Specialist Conf., Williamsburg, Va., 27-28 Feb. 1967

Descriptors: *Aerodynamics, *Rocket vehicle, *Sounding rocket, Fin, Interaction, Jet, Performance, Propulsion, Rocket, Roll, Separation, Sounding, Stabilization, Stage, Supersonic, Test, Tunnel, Vehicle, Wind.

For abstract, see STAR 05 20.
N67-34950 HC$3.00 MF$0.65

EXPERIMENTS CONCERNING THE EFFECT OF TRAILING- EDGE THICKNESS ON BLADE LOSS AND TURBINE STAGE EFFICIENCY.
Gt. Brit. Ministry of Aviation, London. Aeronautical Research Council.
For primary bibliographic entry see Field 21E.
For abstract, see STAR 05 20.
N67-34969 HC$3.00 MF$0.65

A CRITICAL ANALYSIS OF VARIOUS NUMERICAL INTEGRATION METHODS FOR COMPUTING THE FLOW OF A GAS IN CHEMICAL NONEQUILIBRIUM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
H. E. Bailey, and H. Lomax. Aug 67, 44p NASA-TN-D-4109
Contract 129-04-03-02-00-21

Descriptors: *Gas flow, *Nonequilibrium flow, *Numerical integration, Accuracy, Analysis, Calculation, Coefficient, Constant, Coupled, Differential, Efficiency, Equation, Flow, Gas, Integration, Linear, Method, Nonequilibrium, Normal, Numerical, Runge-kutta integration, Shock, Test, Wave.

For abstract, see STAR 05 20.
N67-35012 HC$3.00 MF$0.65

FORCE MEASUREMENTS ON AXISYMMETRIC MODELS WITH HAMMERHEAD NOSES AT TRANSONIC SPEEDS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
B. J. Gambucci, and R. C. Robinson. Aug 67, 19p NASA-TM-X-1433
Contract 124-11-04-09-00-21

Descriptors: *Axisymmetric body, *Hammerhead configuration, *Normal force distribution, *Pitching moment, *Transonic speed, *Wind tunnel model, Angle of attack, Axial, Axisymmetry, Body, Coefficient, Configuration, Distribution, Force, Hammerhead, Launch vehicle, Mach number, Measurement, Model, Moment, Normal, Nose, Pitch, Speed, Transonic, Tunnel, Variation, Wind.

For abstract, see STAR 05 20.
N67-35113 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF HEAT TRANSFER AND PRESSURE DROP OF ARGON FLOWING THROUGH SINGLE TUBE WITH INTERNAL INTERRUPTED FINS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-35114 HC$3.00 MF$0.65

THE RADIATION SOUND FIELD OF A RECTANGULAR PANEL SET IN AN INFINITE WALL AND EXCITED BY A TURBULENT BOUNDARY LAYER.
Gt. Brit. Ministry of Aviation, London. Aeronautical Research Council.
For primary bibliographic entry see Field 20A.
For abstract, see STAR 05 20.
N67-35179 HC$3.00 MF$0.65

MACH NUMBER FUNCTIONS TABLES ACCORDING TO WHITHAM'S THEORY.
Tables de Fonctions Du Nombre de Mach Introduites Dans La Theorie de Whitham
Institut Franco-allemand de Recherches, St. Louis (France).
F. Hagry. 9 May 66, 27p ISL-T-10/66
in French

Descriptors: *Mach number, *Propagation velocity, *Shock wave propagation, Atmosphere, Distribution, Function, Intensity, Mathematics, Number, Parameter, Pressure, Propagation, Shock, Static, Table, Velocity, Wave, Whitham rule.

For abstract, see STAR 05 20.
N67-35183 HC$3.00 MF$0.65

MEASUREMENT OF THE IONIZATION BEHIND HIGH VELOCITY PROJECTILES USING A CAVITY RESONATOR AND A HYPERFREQUENCY INTERFEROMETER.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 20.
N67-35184 HC$3.00 MF$0.65

AERODYNAMIC DATA ON LARGE SEMISPAN TILTING WING WITH 0.5-DIAMETER CHORD, SINGLE-SLOTTED FLAP, AND SINGLE PROPELLER 0.08 CHORD BELOW WING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 20.
N67-35206 HC$3.00 MF$0.65

HEAT CONDUCTION IN HEMISPHERICAL SHELLS WITH APPLICATIONS TO AERODYNAMIC HEATING.
Weapons Research Establishment, Salisbury (Australia).
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-35211 HC$3.00 MF$0.65

TWO-PHASE VORTEX FLOW,
Michigan Univ., Ann Arbor. Lab. for Fluid Flow and Heat Transport Phenomena.
For primary bibliographic entry see Field 20D.
PB-175 778 HC$3.00 MF$0.65

DETERMINATION OF LATERAL STABILITY CHARACTERISTICS FROM FREE-FLIGHT MODEL TESTS, WITH EXPERIMENTAL RESULTS ON THE EFFECTS OF WING VERTICAL POSITION AND DIHEDRAL AT TRANSONIC SPEEDS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Clarence L. Gillis, Jesse L. Mitchell, and Charles T. D'Aiutolo. 1960, 38p NASA-TR-R-65
N62-70489

Descriptors: (*Airplane models, Flight testing), Roll, Model tests, Wings, Transonic characteristics, Swept wings, Reynolds number, Stability, Determination.

A test and analysis method is presented for determining airplane lateral stability characteristics, including aerodynamic derivatives from flight tests of scale models. The method of analysis utilizes the rotating time-vector concept and also a quasi-static approach. Data are presented at transonic speeds for three swept-wing rocket-propelled models differing only in vertical position and dihedral of the wing. The method proved to be adequate for delineating the major effects of the geometric variations on the aerodynamic lateral stability derivatives. The effects of Reynolds number on the linearity of the static stability data for an unswept-wing configuration are illustrated. (Author)
PB-175 866 HC$3.00 MF$0.65

A STUDY OF THE ASYMMETRIC TRANSONIC FLOW PAST A SHARP LEADING EDGE.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Howard A. Stine, Cleo B. Wagoner, and Alvin L. Lugn, Jr. 1960, 74p NASA-TR-R-66
N62-70490

Descriptors: (*Leading edge, *Transonic flow), Flow fields, Two-dimensional flow, Stagnation point, Flow separation, Bubbles, Densitometers.

Experimentally determined features of the flow field about the leading edge of a 12 degree wedge with lower surface at an angle of 13 degrees with respect to the stream and with nearly choked flow in the wind tunnel are compared with the calculated features corresponding to unbounded flow past the same body at a Mach number of exactly unity. (Author)
PB-175 867 HC$3.00 MF$0.65

CALCULATED RESPONSES OF A LARGE SWEPTWING AIRPLANE TO CONTINUOUS TURBULENCE WITH FLIGHT-TEST COMPARISONS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1C.
PB-175 869 HC$3.00 MF$0.65

AN EVALUATION OF EFFECTS OF FLEXIBILITY ON WING STRAINS IN ROUGH AIR FOR A LARGE SWEPT-WING AIRPLANE BY MEANS OF EXPERIMENTALLY DETERMINED FREQUENCY-RESPONSE FUNCTIONS WITH AN ASSESSMENT OF RANDOM-PROCESS TECHNIQUES EMPLOYED.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1C.
PB-175 870 HC$3.00 MF$0.65

JET-BOUNDARY CORRECTIONS FOR LIFTING ROTORS CENTERED IN RECTANGULAR WIND TUNNELS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Harry H. Heyson. 1960, 65p NASA-TR-R-71
AD-237 065, N62-70495

Descriptors: (*Rotary wings, Boundary layer), (*Boundary layer, Corrections), Lift, Wind tunnels, Rectangular bodies, Flight, Simulation, Flow fields.

A theoretical analysis provides numerical values of the correction factor. The results indicate that at high speeds the corrections are the same as those for a wing, but that at low speeds, for the cases considered, there is a large tunnel-induced upwash at the rotor. Increasing the rotor size decreases the correction factors for wide wind tunnels but has little effect upon the correction factors in deep narrow wind tunnels. The corrections are equivalent to a wind-tunnel-induced rate of climb (or sink), and considerable care will be required in the application to very low speed flight conditions. (Author)
PB-175 871 HC$3.00 MF$0.65

COLLECTION OF ZERO-LIFT DRAG DATA ON BODIES OF REVOLUTION FROM FREE-FLIGHT INVESTIGATIONS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
William E. Stoney, Jr. 1961, 191p NASA-TR-R-100

Descriptors: (*Bodies of revolution, *Drag), Flight, Data, Fins, Pressure, Transonic flight, Supersonic flight.

The report presents a compilation of most of the zero-lift drag results obtained from free-flight measurements on fin-stabilized bodies of revolution. The data are arranged on standard forms, which also contain the significant geometrical factors. Supplementary data were provided to facilitate the determination of the body pressure drags from the measured total drags. Summary plots and discussions were included to provide a unified and broad picture of the effects of body geometry on zero-lift drag. (Author)
PB-175 899 HC$3.00 MF$0.65

SIMILARITY OF NEAR NOISE FIELDS OF SUBSONIC JETS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20A.
PB-175 906 HC$3.00 MF$0.65

Group 1A — Aerodynamics

ON FULLY DEVELOPED CHANNEL FSTWS: SOME SOLUTIONS AND LIMITATIONS, AND EFFECTS OF COMPRESSIBILITY, VARIABLE PROPERTIES, AND BODY FORCES.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20D.
PB-175 907 HC$3.00 MF$0.65

SIMILAR SOLUTIONS FOR THE COMPRESSIBLE BOUNDARY LAYER ON A YAWED CYLINDER WITH TRANSPIRATION COOLING.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Ivan E. Beckwith. 25 Jun 58, 41p NASA-TR-R-42
N62-70466

Descriptors: (*Laminar boundary layer, Compressible flow), (*Heat transfer, Cylindrical bodies), (*Skin friction, Cylindrical bodies), Yaw, Numerical analysis, Cooling, Mach number.

Heat-transfer and skin-friction parameters obtained from exact solutions to the laminar compressible boundary-layer equations for infinite cylinders in yaw are presented. The effects of transpiration cooling, Prandtl number, pressure gradient, wall temperature, and viscosity relation were investigated. It is shown that as the Mach number is increased for a given large yaw angle the effects of pressure gradient become larger and the quantity of coolant required to maintain a given wall temperature is also increased. The use of a linear viscosity-temperature relation gives approximately the same results as the Sutherland viscosity-temperature relation except for very high aerodynamic heating rates. (Author)
PB-175 915 HC$3.00 MF$0.65

SHIELDING OF PARTIALLY REFLECTING STAGNATION SURFACES AGAINST RADIATION BY TRANSPIRATION OF AN ABSORBING GAS.
National Aeronautics and Space Administration, Moffett Field, Calif.
For primary bibliographic entry see Field 20M.
PB-175 918 HC$3.00 MF$0.65

1B. Aeronautics

ESTIMATION OF FLYING QUALITIES OF PILOTED AIRPLANES.
Technical rept.,
Douglas Aircraft Co., Inc., Long Beach, Calif.
Douglas E. Drake, and Robert J. Woodcock. Apr 66, 140p
AFFDL-TR-65-218
Contract AF 33 (616)-6460

Descriptors: (*Airplanes, Performance (Engineering)), Aeronautics, Aerodynamic characteristics, Stability, Control systems, Drag, Pitch (Motion), Aeroelasticity, Equations of motion, Maneuverability, Mathematical prediction.

Methods, ranging from rigorous and complicated to simple and approximate, are presented for estimating flying qualities in accordance with such specifications as MIL-F-8785 (ASG). Aerodynamic and inertial data are assumed to be known. Intended mainly for design use, the report gives enough detail to indicate derivations and conditions for validity. Topics include the static and dynamic, controls-fixed and controls-free aspects of aircraft stability, control, and trim. Although emphasis is on linear analysis, methods are given or indicated for such nonlinear problems as drag, pitch-up, inertial coupling, and spinning. An introduction is given to aeroelastic effects, ways to analyze control tabs, a derivation of the controls-free equations of motion, and an introduction to root locus analysis. (Author)
AD-483 622 HC$3.00 MF$0.65

DESCRIPTIONS OF FLYOVER NOISE SIGNALS PRODUCED BY VARIOUS JET TRANSPORT AIRCRAFT.
Bolt Beranek and Newman Inc Los Angeles Calif
For primary bibliographic entry see Field 20A.
AD-657 633 HC$3.00 MF$0.65

FIRE IN U. S. ARMY HELICOPTER ACCIDENTS, 1 JULY 1957 THROUGH 30 JUNE 1965,
Army Board for Aviation Accident Research Fort Rucker Ala
Emil Spezia. Oct 66, 22p Rept no. HF-67-1

Descriptors: (*Helicopters, *Aircraft fires), Statistical data, Aviation accidents, Crash injuries, Mortality rates, Costs, Tables.

A statistical review is presented of 147 major helicopter fire accidents that occurred during an eight-year period. Ninety percent of fires in major accidents erupt on or immediately after the initial impact of the crash sequence. In 48% of the 106 survivable fire accidents, fuel spillage occurred. Fuel tanks and lines continue to fail and cause spillage. Twenty-seven (57%) of the 47 inflight fires for the eight-year period were classified as either precautionary or forced landings. Fourteen inflight fires were present in major accidents. Fires account for 10% of the major accidents and are responsible for 44% of the injured and 72% of the fatalities in all major helicopter accidents. Sixty-six percent of the occupants involved in major fire accidents were injured as compared to 11% in other types of major accidents. Thirty-five percent of the fire-accident occupants received thermal injuries. The occupant survival rate in fire accidents is 64% as compared to 98% for nonfire major accidents. Thirty-five fatalities, 18 in survivable accidents, have been attributed to thermal injuries. The cost of damaged and destroyed helicopters in fire accidents during FY 64-65 totaled eight million dollars. The total for the previous six years was 12 million dollars. (Author)
AD-658 076 HC$3.00 MF$0.65

INJURY EXPERIENCE IN ARMY HELICOPTER ACCIDENTS,
Army Board for Aviation Accident Research Fort Rucker Ala
Kenneth L. Mattox. 1967, 8p Rept no. HF-68-1

Descriptors: (*Helicopters, *Aviation accidents), Crash injuries, Human engineering, Aviation safety, Helmets, Head, Wounds + injuries, Spinal column, Mortality rates.

The gross pattern of injury--site, frequency and seriousness--in U. S. Army helicopter accidents is shown. Although 95 percent of the major helicopter accidents are survivable, 22 percent of the deaths in all helicopter accidents occur in survivable conditions. The mechanisms of these avoidable deaths are discussed as well as the steps that should be taken to reduce the morbidity and mortality rate. (Author)
AD-658 079 HC$3.00 MF$0.65

UNITED STATES ARMY HELICOPTER ACCIDENTS INVOLVING FIRE,
Army Board for Aviation Accident Research Fort Rucker Ala
Emil Spezia. 1964, 24p Rept no. HF-1-64

Descriptors: (*Helicopters, *Aircraft fires), Burns, Statistical data, Survival, Mortality rates, Aviation accidents, Aviation safety, Crash injuries.

A statistical review is presented of 94 major helicopter fire-accidents that occurred during the six-year period, July 1957 - June 1963. Findings of the July 1960 - June 1963 period are compared with those of the three previous years. Ninety percent of the fires erupt on, or immediately after, the initial impact during the crash sequence. Fire accidents of this type demonstrate the need of a fuel system designed to prevent fuel spillage when the helicopter comes to rest. Seventy percent of the crashes involved forces considered within the limits of human tolerance and are classified as survivable. Five inflight fires resulted in major accidents over the six-year period. Of these, two occurred during the recent three-year period, and only one of these resulted in a major accident. Ruptured fuel cells and lines caused fuel spillage and subsequent fire in 80% of the accidents. Fuel served as the flammable source in 87% of the accidents. Accidents involving collision with the ground during controlled and uncontrolled conditions have been found to produce the greatest number of fires. The greatest number of survivable fire accidents resulted from roll-overs and wire strikes. These two cause factors produced an equal number of survivable fire accidents. Though a greater number of fire accidents have occurred during the last three-year period, the material costs of these accidents have decreased approximately one-half million dollars. This decrease is due to the fact that the larger, more expensive models did not show an increase in the number of fire accidents. (Author)
AD-658 080 HC$3.00 MF$0.65

ATC CONCEPTS FOR SUPERSONIC VEHICLES. PART II - I.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 17G.
AD-658 166 HC$3.00 MF$0.65

THE IMPLICATIONS OF ALL-WEATHER LANDING IN THE U.K.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 17G.
AD-658 309 HC$3.00 MF$0.65

LMSC PUBLISHED CONTRIBUTIONS, 1966 IMPRINTS: A CITATION BIBLIOGRAPHY,
Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 5B.
AD-658 396 HC$3.00 MF$0.65

THE DOMESTIC AIR FREIGHT INDUSTRY AND INTRODUCTION OF LARGE SUBSONIC TRANSPORTS,
Analytic Services Inc Falls Church Va
David H. Reeher. Aug 67, 149p

Descriptors: (*Civil aviation, Air transportation), (*Air transportation, Economics), (*Jet transport planes, Economics), Air traffic, Commerce, Distribution (Economics), Costs, Cargo, Airborne, Handling, Packaging, Terminal flight facilities, Management planning, Predictions, Aircraft industry.
Identifiers: Air freight industry, Boeing 747, L-500 aircraft.

Background information is presented on the characteristics and future trends of the U. S. domestic air freight industry. The domestic air freight industry is a transportation system composed of both surface and air links, each performing functions in the movement of commodities from origin to destination. Examination is made of the component functions of the system, its organizational elements and major customer service patterns, and coordination among the elements. The general industry characteristics considered include air freight traffic, and the attitudes, plans, and equipment of certificated passenger-cargo and all-cargo airlines with a high volume of air freight. The air freight forwarders are described, as are other important contributors to the operation and development of the industry. Representative fore-

casts of domestic air freight growth are given, and the industry's efforts to improve its service and meet the anticipated demand are discussed. The planned large subsonic jet transports (Boeing Model 747 and Lockheed L-500 series) are discussed; and their availability, general characteristics, economic performance, and the airlines' apparent preferences for various versions are presented.
AD-658 397 HC$3.00 MF$0.65

ON THE CALCULATION OF THE MAXIMUM SOUND PRESSURE SPECTRUM FROM FIXED AND MOBILE JETS.
Sur le Calcul Du Spectre de Pression Sonore Maximale Emis Par les Jets Stationnaires Et en Vol
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
M. Kobrynski. 1967, 41p ONERA-TN-108/1967/
in French, English Summary

Descriptors: *Jet aircraft, *Noise spectrum, *Takeoff, *Turbojet aircraft, Aerodynamics, Aircraft, Calculation, Energy, Flight, Jet, Noise, Power, Pressure, Sound, Spectrum, Stationary, Supersonic, Trajectory, Turbojet.

For abstract, see STAR 05 20.
N67-34013 HC$3.00 MF$0.65

MODEL FOR PREDICTION OF JET NOISE FROM MEASUREMENTS OF FLUCTUATION TURBULENT STRESSES.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
I. S. Jones. Apr 67, 42p RR-5

Descriptors: *Acoustic radiation, *Jet noise, *Stress measurement, *Subsonic aircraft, Acoustic, Aircraft, Eddy, Evaluation, Far, Field, Flow, Fluctuation, Fourier analysis, Intensity, Jet, Lighthill approximation, Measurement, Noise, Prediction, Quadrupole, Radiation, Reynolds number, Spectrum, Stress, Subsonic, Turbulent, Volume.

For abstract, see STAR 05 20.
N67-34392 HC$3.00 MF$0.65

A MOMENTUM RULE FOR OPTIMUM AIRCRAFT PERFORMANCE IN THE V/STOL TRANSITION REGIME.
National Research Council of Canada, Ottawa (Ontario).
R. J. Templin. Jan 67, 50p LR-470, NRC-9639

Descriptors: *Aircraft performance, *V/stol aircraft, Aircraft, Lifting, Momentum, Optimization, Performance, Power, Propulsion, System, Thrust, Transition, Wind tunnel, Wing.

For abstract, see STAR 05 20.
N67-34660 HC$3.00 MF$0.65

A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING A NATIONAL PROGRAM FOR TRAINING SKILLED AVIATION PERSONNEL,
Arizona State Univ., Tempe.
For primary bibliographic entry see Field 5I.
PB-175 728 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS, JUNE 1951-MAY 1953. SUPPLEMENT NO. 2.
National Advisory Committee for Aeronautics, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 751 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JUNE 1953-MAY 1954. SUPPLEMENT NO. 3.
National Advisory Committee for Aeronautics, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 752 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JUNE 1955-JUNE 1956. SUPPLEMENT NO. 5.
National Advisory Committee for Aeronautics, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 753 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JULY 1956-JUNE 1957. SUPPLEMENT NO. 6.
National Advisory Committee for Aeronautics, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 754 HC$3.00 MF$0.65

INDEX OF NASA TECHNICAL PUBLICATIONS, OCTOBER, 1958 JUNE, 1959.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 769 HC$3.00 MF$0.65

INDEX OF NASA TECHNICAL PUBLICATIONS, JULY, 1959 JUNE, 1960.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-175 770 HC$3.00 MF$0.65

ANALYTICAL STUDY OF SOFT LANDINGS ON GAS-FILLED BAGS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Jack B. Esgar, and William C. Morgan. 1960, 33p NASA-TR-R-75
AD-242 357 N62-70499

Descriptors: (*Soft landings, Deceleration), (*Landing impact, Shock absorbers), Gases, Bags (Containers), Landings, Hydrogen, Helium, Parachutes, Geometric forms, Lunar craft, Lunar probes, Reentry vehicles, Mathematical analysis.

An analytical procedure was developed that is valid for bags of various arbitrary shapes and is applicable to planetary or lunar landings for sinking speeds that are small compared to the sonic velocity of the gas within the bag. For landing on the earth at speeds consistent with normal parachute descent, the relative merits of four bag shapes were evaluated both with and without gas bleed from the bags. Deceleration and onset rates acceptable for well-supported humans seem feasible. (Author)
PB-175 875 HC$3.00 MF$0.65

GROUND REFLECTION OF JET NOISE.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20A.
PB-175 908 HC$3.00 MF$0.65

1C. Aircraft

ESTIMATION OF FLYING QUALITIES OF PILOTED AIRPLANES.
Douglas Aircraft Co., Inc., Long Beach, Calif.
For primary bibliographic entry see Field 1B.
AD-483 622 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME I. PROPELLER AND ROTOR AERODYNAMICS. HELD JUNE 22, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
22 Jun 66, 275p
See also Volume 2, AD-657 563.

Descriptors: (*Helicopters, *Aerodynamic characteristics), (*Vertical take-off planes, Aerodynamic characteristics), (*Short take-off planes, Aerodynamic characteristics), Symposia, Propellers (Aerial), Rotor blades (Rotary wings), Performance (Engineering), Helicopter rotors, Tests, Stresses, Predictions, Aerodynamic loading, Wake, Vortices, Theory.

Contents: A theory for static propeller performance; Propeller testing at zero velocity; Propeller research at Canadair Limited; Prediction of the performance and stress characteristics of VTOL propellers; Performance potential of rotor blade inboard aerodynamic devices; Aerodynamic loading of high-speed rotors; Prediction of

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME II. PROPULSION AND INTERFERENCE AERODYNAMICS. HELD JUNE 23, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
23 Jun 66, 330p
See also Volume 1, AD-657 562 and Volume 3, AD-657 564.

Descriptors: (*Helicopters, *Aerodynamic characteristics), (*Vertical take-off planes, Aerodynamic characteristics), (*Short take-off planes, Aerodynamic characteristics), Symposia, Propulsion, Propellers (Aerial), Shrouded propellers, Fans, Turbines, Nozzles, Wings, Airfoils, Lift, Shear stresses, Interference.

Contents: Predicted and measured performance of two full-scale ducted propellers; Aerothermal dynamic performance of a high bypass tip turbine cruise fan system; Thrust deflection nozzles for VTOL aircraft; Shrouded propeller research at Mississippi State University leading to application on the United States Army XV-11A; The lift, drag and stability of wings immersed in propeller slipstream; Aerodynamic properties of airfoils in nonuniformly sheared flows; Experimental investigation of compound helicopter aerodynamic interference effects; Maximum lift coefficient for STOL aircraft: a critical review.
AD-657 563 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME III. AERODYNAMIC RESEARCH ON BOUNDARY LAYERS. HELD JUNE 24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
24 Jun 66, 154p
See also Volume 2, AD-657 563 and Volume 4, AD-657 565.

Descriptors: (*Helicopters, *Aerodynamic characteristics), (*Vertical take-off planes, Aerodynamic characteristics), (*Short take-off planes, Aerodynamic characteristics), Symposia, Boundary layer, Rotor blades (Rotary wings), Performance (Engineering), Hovering, Boundary layer control systems, Low-drag airfoils, Feasibility studies, Lift.

Contents: Spanwise flow effects on rotor performance; A preliminary study of the effect of a radial pressure gradient on the boundary layer of a rotor blade; The boundary layer of the hovering rotor; An investigation of the feasibility of a common boundary layer control system for high-lift and low-drag on an airfoil section.

and during ground roll and taxi. Flutter analysis, and experimental ground, wind tunnel and flight

AD-657 564 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME IV. PANELS ON RECOMMENDED V/STOL AERODYNAMIC RESEARCH, PANEL SUMMARIES, FEATURED SPEAKERS, AND TECHNICAL PAPER DISCUSSIONS. HELD JUNE 22-24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
24 Jun 66, 382p
See also Volume 3, AD-657 564.

Descriptors: (*Helicopters, *Aerodynamic characteristics), (*Vertical take-off planes, Aerodynamic characteristics), (*Short take-off planes, Aerodynamic characteristics), Symposia, Rotary wings, Stability, Control, Tilt wings, Scientific research.

The following technical papers were presented: Aeronautical research requirements as determined from the X-19 and X-100 VTOL programs; Thoughts on progress in rotating-wing aerodynamics; Some possibilities for research on stability and control at STOL flight speeds; Aerodynamic research - improvements of the tilt wing concept; Aerodynamic problem areas of V/STOL aircraft and recommended research; A discussion of low speed VTOL aerodynamic problems and suggestions for related research; Areas of fruitful research and development for rotary wing aircraft; A comeback of low-speed aerodynamics research; Required aerodynamic research for V/STOL aircraft; Low speed aerodynamic problems associated with helicopters and V/STOL aircraft; Selected research results and recommendations for aerodynamic research; Recommendations for aerodynamic research on helicopters and V/STOL aircraft.
AD-657 565 HC$3.00 MF$0.65

EQUATIONS AND PROGRAMS FOR THE USE OF LOW COST DIGITAL COMPUTING EQUIPMENT IN AERODYNAMIC DESIGN SYNTHESIS AND ANALYSIS OF GENERAL AVIATION AIRCRAFT CONFIGURATIONS.
Technical rept.,
Dodco Inc Blawenburg N J
Daniel O. Dommasch. Mar 65, 160p
FAA-ADS-33
Contract FA-WA-4293

Descriptors: (*Aircraft, Design), (*Civil aviation, Aircraft), Aerodynamic configurations, Equations of motion, Digital computers, Costs, Mathematical analysis, Simulation, Programming (Computers).
Identifiers: General aviation aircraft.

The report presents a summary of analysis methods and digital computer programs developed for low cost simulation of aircraft dynamics and parametric studies of design parameters. The equations and programs presented are completely checked, and approximations, when they are involved, are specifically described. Complete digital programs for longitudinal dynamics, (including air turbulence effects, propeller effects, configuration change effects etc.), three axis controlled six degree of freedom motion and spin simulation are presented. A full description of the governing equations is given. Programs are written in the DICTATOR II language and a description of the DICTATOR II language is also presented. The DICTATOR language is a programming software system designed especially to expedite solution of engineering and scientific problems on digital computers. It can be learned in about 2 hours, and its use, on low cost computers, makes it possible for almost anyone to effectively use a computer for even the most commonplace problems. To demonstrate such use, a chapter on the topic of digital programming is included in the report. (Author)
AD-657 627 Not available from CFSTI.

AN AUTOMATIC ATTITUDE CONTROL SYSTEM FOR A SPINNING SATELLITE: A THEORETICAL ASSESSMENT.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 22B.
AD-657 680 HC$3.00 MF$0.65

STRUCTURAL TEST RESULTS.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Mar 64, 365p Rept no. 145
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program.

Descriptors: (*Vertical take-off planes, Airframes), (*Research planes, Airframes), (*Airframes, Tests), Fuselages, Supports, Loading (Mechanics), Lift, Fans, Structural properties.
Identifiers: V-5 aircraft.

The detailed static test procedures described cover the 23 proof tests and the one ultimate test to be accomplished on the XV-5A aircraft. The procedures include airplane support systems, loading arrangements and methods of load application, along with detailed load reacting structures and load cylinder arrangements. Tables are presented by which load cylinders may be calibrated prior to each test. Instrumentation details are provided showing location of both strain and deflection measuring equipment and times during which specific measurements are to be made. Data recording devices are also indicated. (Author)
AD-657 989 HC$3.00 MF$0.65

FINAL DESIGN WEIGHT REPORT.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Jun 65, 139p Rept no. 159
Contract DA-44-177-TC-715
Report on XV-5A Lift Fan Flight Research Aircraft Program.

Descriptors: (*Vertical take-off planes, Design), (*Research planes, Design), Weight, Moment of inertia, Fuselages, Propulsion, Lift, Fans.
Identifiers: V-5 aircraft.

The report contains weight and balance data in summary and in detail. The summary data are given for several fuel and flight test instrumentation combinations considered compatible with the Flight Test Program. Performance requirements were written for endurance missions of 20 to 45 minutes and therefore weights data are given for the aircraft with fuel to perform these missions with flight test instrumentation included. The design gross weight of the aircraft is 9200 lbs., and therefore data are given for this weight.
AD-657 990 HC$3.00 MF$0.65

INSTALLED SMSX4MS FUNCTIONAL TEST PROCEDURE.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Nov 63, 86p Rept no. 136
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program.

Descriptors: (*Vertical take-off planes, Aircraft equipment), (*Research planes, Aircraft equipment), (*Aircraft equipment, Tests), Performance (Engineering), Lift, Fans, Propulsion, Control sticks.
Identifiers: V-5 aircraft.

The purpose of these tests is to demonstrate that the XV-5A aircraft systems function in accordance with the design requirements. The testing procedure is divided into 12 major tests. The order of appearance is the desired chronological order. When the aircraft is received for functional tests, the hydraulic and pneumatic systems will have been flushed, filled and bled in accordance with Ryan Report 14359-6. The controls will have been rigged in accordance with Ryan Report 14395-5. (Author)
AD-657 991 HC$3.00 MF$0.65

X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. VOLUME I.
General Electric Co Cincinnati Ohio Flight Propulsion Lab Dept
Jan 63, 196p
Contract DA-44-177-TC-715
Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 950.

Descriptors: (*Vertical take-off planes, *Propulsion), (*Research planes, Propulsion), Flight testing, Tests, Reliability, Fans, Turbojet engines, Lift.
Identifiers: V-5 aircraft.

An X353-5B propulsion system comprised of two J85-GE-5 turbojet engines without afterburners, two X353-5B diverter valves, one X353-5 lift fan and one X376 pitch trim control fan was assembled and tested. The specified testing was completed. The J85 gas generators were unaffected by the presence of the X353-5B propulsion system. The diverter valves and the pitch fan met or exceeded performance requirements at all operating conditions. The lift fan met or exceeded performance requirements at all but one condition (single engine lift). There were only minor discrepancies found in the diverter valve and pitch fan hardware at disassembly. The lift fan had considerable damage resulting from the shedding of a small metal tab from the rotor during the last endurance cycle of the test. Lift fan aluminum inlet vanes and exit louvers were of generally poor manufacturing quality and did not satisfactorily complete the test. It was recommended that a flightworthiness rating be assigned to the X353-5B propulsion system upon satisfactory completion of a 10-hour penalty test of new lift fan inlet vanes and exist louvers. (Author)
AD-657 992 HC$3.00 MF$0.65

FLIGHTWORTHINESS AND RELIABILITY SUMMARY REPORT.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Aug 65, 186p Rept no. 162
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft.

Descriptors: (*Vertical take-off planes, Flight testing), (*Research planes, Flight testing), Reliability, Safety, Lift, Fans, Performance (Engineering), Standards, Propulsion.
Identifiers: V-5 aircraft.

The data indicate that the XV-5A aircraft is safe and airworthy. This conclusion was substantiated by analysis, ground test and flight test. The XV-5A is shown to be structurally sound and suitable for use in a flight test program of at least 250 hours. The airplane was manufactured to exacting aircraft standards in choice and use of materials, components and subsystems, and was manufactured and tested with strict quality control standards maintained. Safety and airworthiness of the XV-5A VTOL aircraft, using the lift fan concept, was demonstrated. Flight tests indicate that controllability is adequate and in agreement with acceptable standards. Control is satisfactory in VTOL and CTOL throughout the flight envelope,

and during ground roll and taxi. Flutter analysis, and experimental ground, wind tunnel and flight tests indicate that the aircraft is free of flutter within the prescribed flight envelope. (Author)
AD-657 993 HC$3.00 MF$0.65

CALCULATED HEAT TRANSFER AND COOLING SYSTEM PERFORMANCE, VOLUME II.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Jun 65, 339p Rept no. 160-Vol-2
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program. See also Volume 1, AD-657 995.
Availability: Available in microfiche only.

Descriptors: (*Vertical take-off planes, Cooling + ventilating equipment), (*Research planes, Cooling + ventilating equipment), (*Cooling + ventilating equipment, Performance (Engineering)), Cooling, Heat transfer, Airframes, Thermal insulation, Thermal analysis.
Identifiers: V-5 aircraft.

Volume II contains supporting data including test results providing the basis for estimates of external airframe heating, methods used in calculation of cooling system performance and an analysis of structural protection systems.
AD-657 994 MF$0.65

CALCULATED HEAT TRANSFER AND COOLING SYSTEM PERFORMANCE, VOLUME I.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Jun 65, 303p Rept no. 160-Vol-1
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program. See also Volume 2, AD-657 994.
Availability: Available in microfiche only.

Descriptors: (*Vertical take-off planes, Cooling + ventilating equipment), (*Research planes, Cooling + ventilating equipment), (*Cooling + ventilating equipment, Performance (Engineering)), Cooling, Heat transfer, Turbojet engines, Downwash, Thermal insulation, Fuselages.
Identifiers: V-5 aircraft.

Based on analysis and limited test data, the aircraft cooling and structural protection systems are believed to have sufficient performance capability to permit orderly conduct of Installed System Functional, NASA-Ames 40' x 80' Wind Tunnel, and Edwards Air Force Base Flight Test Programs even though externally induced environmental temperatures to 1040F develop during fan mode operation. Occasional local and minor overheating problems are expected within the broad range of possible operating conditions; however, it is expected they can be overcome with minor structural modifications, installation of additional insulation, and/or minor modification of operational procedures. Lack of detailed knowledge of the externally induced environment made cooling and structural systems designs and analysis difficult. In an attempt to gain further insight to this complex problem, a procedure was developed whereby existing literature data on downwash phenomena could be applied quantitatively to the XV-5A induced environment. Results show directional effects of aircraft control settings, and indicate the strong possibility of hot gas ingestion by the engine and cooling system air inlet. These results also indicate means whereby adverse effects may be minimized or eliminated. (Author)
AD-657 995 MF$0.65

INSTALLED SYSTEMS FUNCTIONAL TESTS REPORT.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Sep 64, 312p Rept no. 149
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program.
Availability: Available in microfiche only.

Descriptors: (*Vertical take-off planes, Tests), (*Research planes, Tests), Aircraft equipment, Flight control systems, Cockpits, Turbojet engines, Fans, Lift, Landing gear, Fire extinguishers, Performance (Engineering).
Identifiers: V-5 aircraft.

The installed systems tests demonstrate that the aircraft systems function in accordance with design requirements. Tests were divided into thirteen major functional areas as follows: Electrical system checkout; surface gains and hysteresis; flight controls stability; flight mode conversion sequence; cockpit checkout; engine run temperature survey; engine run electrical system checkout; auto-stability tests; fan flight trim rates; landing gear tests; controls proof loads; weight-balance and fuel tests; fire extinguisher system tests.
AD-657 996 MF$0.65

FUSELAGE STRUCTURAL ANALYSIS. VOLUME III. FRAMES, BULKHEADS AND FITTINGS.
General Electric Co Cincinnati Ohio Advanced Engine and Technology Dept
Feb 64, 98p Rept no. 144-Vol-3
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program. See also Volume 2, AD-653 564 and Volume 4, AD-640 338.

Descriptors: (*Vertical take-off planes, Fuselages), (*Research planes, Fuselages), (*Fuselages, Structural properties), Loading (Mechanics), Airframes, Fittings, Mathematical analysis, Supports.
Identifiers: V-5 aircraft.

A summary type load analysis is presented for each component, with the primary intent of showing the structural configuration, final critical loading and unusual assumptions made. Structural adequacy of many of the primary components was demonstrated by proof tests.
AD-657 997 HC$3.00 MF$0.65

FLIGHT AND FIRING EVALUATION OF A SURFACE-TO-AIR GUNNERY TOW TARGET.
Naval Air Development Center Johnsville Pa Aero Mechanics Dept
For primary bibliographic entry see Field 19E.
AD-658 315 HC$3.00 MF$0.65

LEADING-EDGE SPIKES TO REDUCE THE DRAG OF WINGS AT SUPERSONIC AIRSPEEDS,
David Taylor Model Basin Washington D C Aerodynamics Lab
For primary bibliography See Field 20D
AD-658-330 HC$3.00 MF$.065

RESULTS OF A BRIEF FLIGHT INVESTIGATION OF A COIN-TYPE STOL AIRCRAFT.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
T. W. Feistel, and R. C. Innis. Aug 67, 39p
NASA-TN-D-4141
Contract 721-04-00-02-00-21

Descriptors: *Flight test, *Ov-10 aircraft, *Stol aircraft, Characteristics, Control, Cruise, Descent, Effect, Engine, Flight, Handling, Instrumentation, Landing, Low speed, Operation, Performance, Regime, System, Takeoff, Test, Trim.

For abstract, see STAR 05 20.
N67-35029 HC$3.00 MF$0.65

RESONANCE TESTS ON A BEAGLE B206 SERIES 1 AIRCRAFT.
Royal Aircraft Establishment, Farnborough (England).
F. J. Hawkins, and R. F. Mousley. Oct 66, 45p
RAE-TR-66309

Descriptors: *Beagle b-206 aircraft, *Ground resonance, *Resonance testing, Automatic, Diagram, Excitation, Force, Frequency, Ground, Measurement, Mode, Reliability, Resonance, Testing, Transducer, Vibration.

For abstract, see STAR 05 20.
N67-35194 HC$3.00 MF$0.65

AERODYNAMIC DATA ON LARGE SEMISPAN TILTING WING WITH 0.5-DIAMETER CHORD, SINGLE-SLOTTED FLAP, AND SINGLE PROPELLER 0.08 CHORD BELOW WING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
M. P. Kink. Jul 67, 203p NASA-TN-D-4030

Descriptors: *Aerodynamic characteristics, *Longitudinal stability, *Tilt-wing aircraft, *V/stol aircraft, Aerodynamic, Aircraft, Characteristics, Descent, Drag, Flap, Flow, Lift, Longitudinal, Model, Pitch, Propeller, Rotation, Stability, Tilt, Wing.

For abstract, see STAR 05 20.
N67-35206 HC$3.00 MF$0.65

NEW PROCEDURE FOR DETERMINATION OF THE COORDINATES OF THE CENTER OF GRAVITY OF AN AIRCRAFT.
Metodo Per Il Rilevamento Delle Coordinate Del Centro Di Gravita Di Un Velivolo
Italy. Ministero Difesa Aeronautica, Rome.
M. Cassetti. 1966, 18p REPT.-26
in Italian, English Summary

Descriptors: *Aircraft design, *Gravity center, *Symmetry, Aircraft, Center, Coordinate, Design, Gravity, Inclination, Plane, Tool.

For abstract, see STAR 05 20.
N67-35248 HC$3.00 MF$0.65

PROCEEDINGS OF THE ATMOSPHERIC RESEARCH AIRCRAFT INSTRUMENTATION WORKSHOP ANS SYMPOSIUM, NOVEMBER 17-18, 1966, OKLAMOMA CITY, OKLAMOMA.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-175 777 HC$3.00 MF$0.65

MECHANICAL PROPERTIES OF PNEUMATIC TIRES WITH SPECIAL REFERENCE TO MODERN AIRCRAFT TIRES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Robert F. Smiley, and Walter B. Horne. 1960, 63p
NASA-TR-R-64
N62-70488

Descriptors: (*Aircraft tires, Mechanical properties), Tires, Pneumatic systems, Force (Mechanics), Deflection, Performance (Engineering), Loading (Mechanics).

A study is presented of most of the properties of pneumatic tires which are of interest to aircraft designers. The principal topics discussed are the vertical-force-deflection characteristics; lateral, fore-and-aft, and torsional spring constants; footprint-area properties; relaxation lengths; rolling radius; cornering force, cornering power, self-aligning torque, and pneumatic caster for yawed rolling conditions; effects of wheel tilt; and tire radial

growth under the influence of centrifugal forces. For each tire property considered, semiempirical equations are set up which take into account the major factors pertinent to the property. Wherever possible each equation is compared with the available experimental data to establish its degree of reliability. (Author)
PB-175 865 HC$3.00 MF$0.65

DETERMINATION OF LATERAL STABILITY CHARACTERISTICS FROM FREE-FLIGHT MODEL TESTS, WITH EXPERIMENTAL RESULTS ON THE EFFECTS OF WING VERTICAL POSITION AND DIHEDRAL AT TRANSONIC SPEEDS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 866 HC$3.00 MF$0.65

CALCULATED RESPONSES OF A LARGE SWEPTWING AIRPLANE TO CONTINUOUS TURBULENCE WITH FLIGHT-TEST COMPARISONS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Floyd V. Bennett, and Kermit G. Pratt. 1960, 28p NASA-TR-R-69
N62-70493

Descriptors: (*Airplanes, Aeroelasticity), (*Swept wings, Strain (Mechanics)), Turbulence, Flight testing, Bending, Aerodynamic loading, Gust loads, Response, Functions.

Calculated responses of symmetrical airplane motions, wing deformations, and wing loads due to continuous turbulence are shown to compare favorably with available flight-test results. These calculated responses are based on random-process theory, five degrees of freedom, lifting-surface aerodynamics, and one-dimensional turbulence. Of the five degrees of freedom used only three, rigid-body translation and pitch modes and the first wing bending mode, are shown to contribute significantly to the airplane responses over the frequency range considered (0 to 2 cps). Bending-moment amplification factors are presented in order to show the effects of dynamic aeroelasticity. These effects are found to increase the response by 35 to 115 percent, depending upon the spanwise station. (Author)
PB-175 869 HC$3.00 MF$0.65

AN EVALUATION OF EFFECTS OF FLEXIBILITY ON WING STRAINS IN ROUGH AIR FOR A LARGE SWEPT-WING AIRPLANE BY MEANS OF EXPERIMENTALLY DETERMINED FREQUENCY-RESPONSE FUNCTIONS WITH AN ASSESSMENT OF RANDOM-PROCESS TECHNIQUES EMPLOYED.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Thomas L. Coleman, Harry Press, and May T. Meadows. 1960, 37p NASA-TR-R-70
N62-70494

Descriptors: (*Bombers, Aeroelasticity), (*Swept wings, Strain (Mechanics)), Turbulence, Flight testing, Structural properties, Bending, Shear stresses, Functions, Gust loads.
Identifiers: Evaluation.

Flight test measurements on a large swept-wing bomber airplane through rough air at altitudes of 5,000 and 35,000 feet are analyzed in order to determine the effects of airplane flexibility on wing bending and shear strains. For this purpose, the power spectra of the strain responses and the frequency-response functions for the strain responses to vertical gust disturbances are determined and compared with the strain responses for a quasi-rigid airplane. The measured power spectra and frequency-response functions are subject to distortion and statistical sampling errors from a variety of sources. A general analysis of the reliability of such results is presented and methods of estimating the distortions and sampling errors are developed. These methods are applied to the interpretation of the test results. (Author)
PB-175 870 HC$3.00 MF$0.65

JET-BOUNDARY CORRECTIONS FOR LIFTING ROTORS CENTERED IN RECTANGULAR WIND TUNNELS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 871 HC$3.00 MF$0.65

THEORETICAL PRESSURE DISTRIBUTIONS ON WINGS OF FINITE SPAN AT ZERO INCIDENCE FOR MACH NUMBERS NEAR 1.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Alberta Y. Alksne, and John R. Spreiter. 1961, 50p NASA-TR-R-88
AD-248 856, N62-70512

Descriptors: (*Wings, Pressure), Transonic flow, Differential equations, Aspect ratio, Drag, Wedges, Distribution.

A method employed heretofore by the authors to obtain approximate solutions of the transonic flow equation for plane and axisymmetric flow is extended to give reasonable results for wings of finite span, consistent with the known properties of transonic flows. In this method the partial differential equation appropriate to the study of transonic flow is replaced by a nonlinear ordinary differential equation which can be solved by numerical methods. Asymptotic forms of this differential equation are given for very high and very low aspect ratios and analytic results are obtained for certain special cases. Numerical results, calculated by use of electronic computing machines, are given in the form of pressure distribution and pressure drag for two profile shapes, wedge and circular arc, for wings of rectangular plan form. The range of aspect ratios covered extends effectively from zero to infinity and agreement with the asymptotic results is shown at both limits. (Author)
PB-175 893 HC$3.00 MF$0.65

NORMAL COMPONENT OF INDUCED VELOCITY FOR ENTIRE FIELD OF A UNIFORMLY LOADED LIFTING ROTOR WITH HIGHLY SWEPT WAKE AS DETERMINED BY ELECTROMAGNETIC ANALOG.
Technical rept.,
National Aeronautics and Space Administration, Washington, D. C.
Walter Castles, Jr., Howard L. Durham, Jr., and Jirair Kevorkian. 21 Feb 57, 26p NASA-TR-R-41
Prepared in cooperation with Georgia Inst. of Tech.

Descriptors: (*Helicopter rotors, Flow fields), Velocity, Aerodynamic loading, Wake, Lift, Vortices.

Values of the normal component of induced velocity throughout the entire field of a uniformly loaded rotor at high speed are presented in the form of charts and tables. Many points were found by an electromagnetic analog, details of which are given. Comparisons of computed and analog values for the induced velocity indicate that the latter are sufficiently accurate for engineering purposes. (Author)
PB-175 914 HC$3.00 MF$0.65

1D. Aircraft Flight Control and Instrumentation

INTEGRATED ELECTRONIC VERTICAL DISPLAY RESEARCH.
Interim technic rept. 1 Jul-31 Dec 66,
United Aircraft Corp Norwalk Conn Norden Div
Harold C. Wooding, Jr., and John A. Simpson. 24 Feb 67, 116p Rept no. 1161-R-0028
Contract Nonr-4489 (00)

Descriptors: (*Flight instruments, *Display systems), Integrated systems, Aircraft, Simulation, Flight speeds, Electronic equipment, Design.
Identifiers: V/STOL aircraft, JANAIR project.

The report describes the results of the initial phases of the Integrated Electronic Vertical Display (IEVD) Research Program. These initial phases are the study and analysis phases, which preface the simulation, evaluation of the simulation, and the display mechanization. The objective of the program is to originate and develop design recommendations for a universal IEVD. Such a vertical display will permit instrument flight rules (IFR) flight to a realistic set of performance criteria which are projected as being representative of military requirements for the 1970-75 time period. Typical vehicles and missions have been specified after a systematic analysis of many diverse types of aircraft and their corresponding missions. The requirements for these aircraft have been projected on the basis of the aircraft being part of the military inventory during the 1970's. Particular interest has been directed toward those craft capable of V/STOL and high speed flight in forming the generalized requirements. (Author)
AD-657 951 HC$3.00 MF$0.65

RADAR CONTINUOUS-WAVE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17I.
AD-658 370 HC$3.00 MF$0.65

FEED-BACK ACCELEROMETER CIRCUITS WITH A VELOCITY OUTPUT.
Aeronautical Research Council (Gt. Brit.)
R. H. Evans, and G. G. Haigh. 1967, 31p ARC-R+M-3462, RAE-TR-64005

Descriptors: *Accelerometer, *Circuit, *Feedback control system, Amplifier, Control, Design, Drift, Feedback, Integration, Loop, Output, System, Velocity, Voltage.

For abstract, see STAR 05 20.
N67-34664 HC$3.00 MF$0.65

IMPROVEMENTS TO FLIGHT INSTRUMENTS TO ENABLE THE PILOT TO CONTROL THE AIRCRAFT RIGHT TO TOUCH-DOWN.
Amelioration des Instruments de Bord Permettant le Controle de l'Avon Jusqu'au Sol
Royal Aircraft Establishment, Farnborough (England).
R. Lami. Jan 67, 20p RAE-LIB-TRANS-1214
Transl. Into English From Tech. Sci. Aeronaut. Spatiales (Paris), V. 1, 1965 P 7-12

Descriptors: *Aircraft control, *Flight instrument, *Landing aid, *Pilot, Aid, Aircraft, Automatic, Control, Flight, Improvement, Instrument, Landing, Method, Monitor, Path, System, Touchdown, Visibility, Weather, Zero.

For abstract, see STAR 05 20.
N67-35000 HC$3.00 MF$0.65

1E. Air Facilities

DEVELOPING A SET OF CBR DESIGN CURVES.

Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 13B.
AD-658 078 HC$3.00 MF$0.65

2. AGRICULTURE

2D. Agronomy and Horticulture

FLUCTUATIONS IN FORAGE QUALITY ON SUMMER RANGE IN THE BLUE MOUNTAINS.
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
For primary bibliographic entry see Field 2F.
PB-175 727 HC$3.00 MF$0.65

2F. Forestry

DETERMINATION OF TEMPERATURE DISTRIBUTION IN WOOD WITH VARIABLE SURFACE TEMPERATURE BY NUMERICAL INTEGRATION OF DUHAMEL'S INTEGRAL.
Forest Products Lab Madison Wis
For primary bibliographic entry see Field 20M.
AD-657 953 HC$3.00 MF$0.65

DETERMINATION OF TEMPERATURE DISTRIBUTION IN WOOD WITH VARIABLE SURFACE TEMPERATURE BY NUMERICAL INGEGRATION OF DUHAMEL'S INTEGRAL.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
PB-175 669 HC$3.00 MF$0.65

APPALACHIAN HARDWOODS FOR PALLETS-A LABORATORY EVALUATION.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
PB-175 670 HC$3.00 MF$0.65

ANNUAL REPORT 1966 OF THE PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION.
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
1967. 39p
Availability: Original document in color until exhausted.

Descriptors: (*Forestry, Reports), Management engineering, Economics, Commerce, Wood, Insects, Plants (Botany), Trees, Entomology, Pesticides, Erosion, Soils, Recreation, Damage, Animals.

Forest survey, forest economics, forest products, marketing and utilization, and engineering research; (forest survey, survey techniques, production economics, marketing, regional utilization problems, wood quality research, forest engineering); Timber management and forest fire research; (seeding, planting, and nursery practice, breeding northwestern trees, silviculture of interior conifer types, silviculture of true fir-mountain hemlock and sitka spruce-western hemlock types, silviculture of mixed pine-fir forests, brushfield reclamation, silviculture of douglas-fir, animal damage control, mensuration, fuel inventory systems, fire danger rating); Forest insect and disease research; (forest insect biology and ecology, forest insect nutrition and behavior, diseases of western forest insects, diseases reducing forest production, root diseases and soil microbiology); Watershed management, recreation, range management, and wildlife habitat research; (water yield and erosion, watershed logging methods and streamflow, pesticides-soil and water, range ecology and management, big-game habitat, wilderness recreation dynamics). (Author)
PB-175 671 HC$3.00 MF$0.65

NORTHWEST RANGE-PLANT SYMBOLS,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
George A. Garrison, John M. Skovlin, and Charles E. Poulton. 1967, 128p
RP-PNW-40

Descriptors: (*Forestry, *Data processing systems), (*Plants (Botany), *Symbols), Grasses, Trees, Computers, Standardization, Coding, Oregon.

Alpha and numeric code listings of common range grasses, sedges, rushes, forbs, shrubs, and trees of the Pacific Northwest. Primarily of value to those workers desiring to utilize automatic data processing for compilation and analysis of vegetation studies or range survey data, although just the name lists will be helpful to some workers. (Author)
PB-175 672 HC$3.00 MF$0.65

VIRGINIA'S TIMBER, 1966,
Southeastern Forest Experiment Station, Asheville, N. C.
Herbert A. Knight, and Joe P. McClure. 1967, 52p
RB-SE-8

Descriptors: (*Forestry, Virginia), Industries, Trees, Volume, Wood pulp, Plywood, Growth, Wood, Cutting, Tables.

The report presents the principal findings of the third Forest Survey of Virginia's timber resource. The resurvey was started in November 1964 and completed in August 1966. Findings of the two previous surveys, completed in 1940 and 1957, provide the basis for measuring the changes that have occurred and the trends that have developed during the past 26 years. (Author)
PB-175 674 HC$3.00 MF$0.65

MASS SOIL MOVEMENTS IN THE H. J. ANDREWS EXPERIMENTAL FOREST.
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
For primary bibliographic entry see Field 8L.
PB-175 711 HC$3.00 MF$0.65

FLUCTUATIONS IN FORAGE QUALITY ON SUMMER RANGE IN THE BLUE MOUNTAINS.
Research paper,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
Jon M. Skovlin. 1967, 25p RP-PNW-44

Descriptors: (*Grasses, Periodic variations), (*Forestry, Oregon), Climatology, Mountains, Terrain, Drainage, Trees, Soils, Rainfall, Plants (Botany), Growth, Quantitative analysis, Nutrition, Bovines, Tables.

The paper combines unpublished research with several reported studies in an attempt to assess overall range forage value in the Blue Mountains. Much of the work has been done on the Starkey Experimental Forest and Range. It has been a field proving ground for grazing research on forest and related ranges for over 25 years. (Author)
PB-175 727 HC$3.00 MF$0.65

FOREST STATISTICS FOR THE PIEDMONT SOUTH CAROLINA 1967,
Southeastern Forest Experiment Station, Asheville, N. C.
William H. B. Haines. Jul 67, 39p
RB-SE-9

Descriptors: (*Forestry, South Carolina), (*Statistical data, Forestry), Sampling, Volume, Growth, Commerce, Tables.

Area of commercial forest land in the South Carolina Piedmont has increased from 4.1 to almost 4.5 million acres since the last survey in 1958. Area in pine and oak-pine types has increased from 63 to almost 72 percent of the commercial forest. Volume of softwood timber, which had been decreasing before 1958, has increased by 23 percent. Hardwood volume continues to increase, and at a faster rate than between the two previous surveys. In 1966 growth of all timber exceeded timber removals by 46 percent. (Author)
PB-175 729 HC$3.00 MF$0.65

PRODUCTION RATES IN COMMERCIAL THINNING OF YOUNG-GROWTH DOUGLAS-FIR,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
Thomas C. Adams. 1967, 40p
RP-PNW-41

Descriptors: (*Trees, Forestry), (*Forestry, *Economics), Costs, Labor, Volume, Wood, Law, Handling, Tables.

Time studies were made of the individual steps in the thinning operation, including felling and bucking, skidding, and loading. Calculated times per unit of production were related to log and tree volumes , in both cubic feet and board feet, and to skidding distance, type of equipment, and other variables. These production rates, combined with labor and machine rates, permit estimation of unit costs related to log size. (Author)
PB-175 730 HC$3.00 MF$0.65

TIMBER RESOURCES AND INDUSTRIES IN THE ROCKY MOUNTAIN STATES.
Resource bull.,
Intermountain Forest and Range Experiment Station, Ogden, Utah.
Alvin K. Wilson, and John S. Spencer, Jr. 1967, 70p RB-INT-7

Descriptors: (*Forestry, *Wood), (*Industries, Wood), Trees, Natural resources, Wood pulp, Plywood, Growth, Terrain, Production, Tables, Maps.

Statistics from many sources have been compiled to present the most complete set of data on timber inventory, cut, and timber products output that has ever been prepared for the Rocky Mountain States as a whole. Numerous agencies and individuals are studying Mountain States' resources and the possibilities for their development. This report provides much of the basic timber resource and timber industry data needed for these studies. (Author)
PB-175 791 HC$3.00 MF$0.65

BUILDUP INDEXES FOR INTERIOR ALASKA, 1956-1965,
Pacific Northwest Forest and Range Experiment Station, Juneau, Alaska. Inst. of Northern Forestry.
For primary bibliographic entry see Field 13L.
PB-175 792 HC$3.00 MF$0.65

SEED DISPOSAL IN A BUMPER SPRUCE SEED YEAR.
Research paper,
Intermountain Forest and Range Experiment Station, Ogden, Utah.
Arthur L. Roe. 1967, 14p RP-INT-39

Descriptors: (*Forestry, *Seeds), Trees, Sources, Disposal, Sampling, Volume, Tables.

Spruce trees in the Intermountain region produced a bumper seed crop in 1964, as revealed by seed trap studies and cone scar counts. The extent of dispersal of this seed into openings in the timber stand was largely determined by the quantity and

condition of the seed source bordering the openings, and by the distance of the seed source from the timber margin. Although large quantities of seed were released at the timber edge, an amount equal to less than 5 percent of this seed was dispersed as far as 10 chains into openings. The dispersal pattern away from the timber edge very closely followed an exponential distribution. The cone crop in 1964 ranged from 2 to 13 times greater than the comparable annual crops produced in the previous 3 years on the study areas. (Author)
PB-175 798 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

PATH OF THE FIREBALL OF JUNE 14, 1967,
National Research Council of Canada Ottawa (Ontario) Div of Radio and Electrical Engineering
Bruce A. McIntosh. 1967, 3p
NRC-9681
Availability: Published in R.A.S.C. Journal v61 n4 2p 1967.

Descriptors: (*Meteors, Canada), (*Trajectories, Meteors), Ionization, Upper atmosphere, Range finding, Asteroids.

A bright fireball was seen in the Toronto-Ottawa-Montreal area on the evening of June 14. Records of it obtained on the meteor radar and auroral all-sky camera at Springhill Meteor Observatory have enabled a trajectory to be determined.
AD-657 705 Not available from CFSTI.

A RADIO SURVEY OF THE REGION OF NGC 6781,
Arecibo Ionospheric Observatory Puerto Rico
Yervant Terzian. 30 Nov 66, 4p
AFOSR-67-1977
Contract AF 49 (638)-1156
Availability: Published in Astronomical Journal v72 n3 p443-4 Apr 1967.

Descriptors: (*Planetary atmospheres, *Nebulae), Radio signals, Ionosphere, Astronomical observatories, Thermal properties, Calibration, Tables.

Radio observations at 430 and 611 MHz were made of the region of the planetary nebula NGC 6781. The results are given as a radio map at 611 MHz with a half-power beamwidth of 9.2. It is seen that the optical planetary nebula coincides with a weak radio source just north of an extended and relatively strong radio complex. The results indicate that NGC 6781 is a thermal source. (Author)
AD-657 721 Not available from CFSTI.

THE FIREBALL OF APRIL 25, 1966. I. CANADIAN VISUAL OBSERVATIONS,
National Research Council of Canada Ottawa (Ontario)
B. A. McIntosh, and J. A. V. Douglas. Aug 67, 21p Rept no. NRC-9595
Availability: Published in Journal of Royal Astronomical Soc of Canada v61 p159-78 Aug 1967.

Descriptors: (*Astronomy, Canada), Trajectories, Luminescence, Colors, Visibility, Illumination, Visual perception, Meteors, Noise.

A bright fireball at 19h 14m E.S.T. on 25 April, 1966 drew the attention of many hundreds of observers in eastern North America. Analysis of the Canadian visual observations has shown that the fireball entered on a very flat trajectory, travelled almost due north and ended at a height of 9 miles above a point 4 miles west of Huntingdon, Quebec. Its appearance and sounds are described. A possible fall area is indicated but no fragments have been found. (Author)
AD-657 738 Not available from CFSTI.

COSMOLOGICAL ELEMENT PRODUCTION,
California Inst of Tech Pasadena
Robert V. Wagoner. 1967, 9p
Contract Nonr-220 (47), Grant NSF-GP-5391
Availability: Published in Science v155 n3768 p1369-76 Mar 17 1967.

Descriptors: (*Solar systems, *Chemical elements), Galaxies, Deuterium, Helium, Lithium, Photons, Nuclear reactions, Isotopes, High-temperature research, Stars, Electrons, Neutrinos, Measurement, Night sky.

Two recent observations appear to have provided critical information about the past history of the universe. The thermal character of the microwave background radiation suggests that the universe has expanded from a state of high temperature and density, and places constraints on such a big-bang cosmology. The observations of very weak helium lines in the spectra of certain stars in the halo of our galaxy are possibly due to a low primeval abundance of this element. However, the simplest model of a big-bang cosmology leads to much higher helium abundances, such as are observed in the solar system and in many stars. The production of helium can be reduced either by altering the early expansion rate or by introducing degenerate electron neutrinos. Observations of interstellar and intergalactic deuterium and He (4), and possibly even He (3) and Li (7), are needed to test the various models. (Author)
AD-657 969 Not available from CFSTI.

DIMENSIONS OF SOUTHERN PLANETARY NEBULAE.
Technical rept.,
Dearborn Observatory Evanston Ill
Karl G. Henize, and Bengt E. Westerlund. 9 Sep 66, 23p Rept no. TR-5
Contract Nonr-1228 (19)
Revision of manuscript submitted 4 Aug 66. Rept. on A Statistical and Astrophysical Investigation of Emission-Line Stars and Planetary Nebulae in the Southern Milky Way. Prepared in cooperation with Australian cooperation with Australian National Univ., Canberra. Mount Stromlo Observatory.
Availability: Published in Astrophysical Journal Supplement Series v14 p154-69 Apr 1967.

Descriptors: (*Astronomical observatories, *Nebulae), Planets, Classification, Photographs, Brightness, Astronomical data, Tables.

Direct photographs in Ha light with the Mount Stromlo 74-inch reflector have been obtained of 229 objects listed by Henize as planetary nebulae or possible nebulae. Of these, 151 are found to be resolved. The morphological classifications, surface brightnesses, and angular dimensions of these nebulae are tabulated, and photographs of 99 nebulae are given in an atlas accompanying the catalogue. (Author)
AD-657 979 Not available from CFSTI.

OBSERVATIONS OF SOUTHERN PLANETARY NEBULAE.
Technical rept., revised ed.
Dearborn Observatory Evanston Ill
Karl G. Henize. 9 Sep 66, 31p Rept no. TR-4
Contract Nonr-1228 (19)
Revision of manuscript submitted 4 Aug 66. Rept. on A Statistical and Astrophysical Investigation of Emission-Line Stars and Planetary Nebulae in the Southern Milky Way.
Availability: Published in Astrophysical Journal Supplement Series v14 p125-53 Apr 1967.

Descriptors: (*Astronomical observatories, *Nebulae), Continuous spectrum, Intensity, Resolution, Images, Astronomical cameras, Exposure, Galaxies, Frequency, Tables, Stars, Astrophysics.

An H alpha survey of the entire southern sky south of -25 degrees declination with the Mount Wilson 10-inch objective-prism camera has resulted in a catalogue of 459 objects classifiable as planetary nebulae or possible planetary nebulae. Of these, approximately 150 are newly discovered. The catalogue gives for both old and new nebulae basic data including intensity of H alpha image, intensity of the continuum, degree of resolution of the H alpha image, and presence of emission lines other than H alpha. Where possible, nebular diameter and the intensity ratio of (N II) wavelength 6584 to H alpha are also listed. Since one of the more significant features of this catalogue is its broad coverage and its observational uniformity, a careful study of its purity and completeness has been made. The surface distribution of these nebulae shows, in addition to the well-known concentration toward the galactic center, significant concentrations in Norma and Crux. An analysis of the frequency of (N II) shows that 22 per cent of the nebulae which might show (N II) have (N II)/H alpha ratios greater than 0.5, 22 percent have ratios between 0.1 and 0.5, and 56 per cent show no (N II). (Author)
AD-657 981 Not available from CFSTI.

LIFE IN THE UNIVERSE,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 6C.
AD-658 009 HC$3.00 MF$0.65

HARMONIC ANALYSIS OF THE SELENODETIC CONTROL SYSTEM OF THE DEPARTMENT OF DEFENSE,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
T. A. Bray, and C. L. Goudas. Jul 67, 36p Rept no. D1-82-0631, Mathematical note-518

Descriptors: (*Moon, Asymmetric bodies), (*Control systems, Harmonic analysis), Rotation, Gravity, Ellipsoids, Lunar satellites, Terrain.

The Department of Defense Selenodetic Control System 1966 (DOD-66) is expressed here in terms of spherical harmonics. The coefficients obtained are different from those obtained on the basis of all previous systems. The second zonal harmonic corresponding to the DOD-66 suggests the improbable hypothesis that the Moon is elongated along the axis of rotation and, in particular, that the polar diameter exceeds the equatorial diameter by about 1 kilometer. (Author)
AD-658 161 HC$3.00 MF$0.65

A STUDY OF THE EARTHLIGHT ON THE MOON.
Final rept. Apr 66-May 67 and special pub,
Leander Mccormic Observatory Charlottesville Va
D. Scott Birney, Jr., and David D. Meisel. May 67, 215p Rept no. SP-67-201
Contract DA-49-129-ENG-566

Descriptors: (*Astronomical observatories, Moon), (*Earth (Planet), Light), Illumination, Reflection, Intensity, Measurement, Brightness, Photographs, Scattering, Photometers, Astronomy, Telescopes, Surface properties, Geometry, Maps, Tables.

The observational theoretical and empirical problems of determining the contribution of earthlight to the night-time illumination on the moon have been considered in detail. A photographic survey program to determine the absolute intensity of the earthlight portion of the moon is described. An empirical phase curve relating the mean magnitude difference between the earth and the sun has been derived from visual photometry measurements. The problems of predicting the albedo of the earth

as well as predicting the mean albedo of specific location on the lunar surface are reviewed. Theoretical and empirical determinations of the photometric function of the lunar surface are discussed. Tables and graphs of relative surface brightness under earthlight are presented for a number of locations on the moon. These include information about nine APOLLO sites as well as locations every 5 deg. of longitude and latitude between plus or minus 50 deg. longitude and latitude. The tables are for zero libration. Although the tables and graphs have been compiled under simplifying assumptions; instructions for making the necessary corrections to specific situations are discussed.
AD-658 168 HC$3.00 MF$0.65

A THEORETICAL STUDY OF METEORIC TRAJECTORIES AND PROCESSES, INCLUDING EXAMINATION OF THE INCIDENCE AND CHARACTERISTICS OF PHOTOGRAPHIC METEORS BY REDUCTION OF ABOUT 600 DATA POINTS.
Harvard Coll. Observatory, Cambridge, Mass. Meteor Dept.
R. E. Mc Crosky, and A. Posen. Aug 67, 52p
NASA-CR-862
Grant NSG-460

Descriptors: *Astronomical photography, *Data reduction, *Meteor, *Star field, Astronomical, Automatic, Data, Field, Identification, Orbit, Photography, Reduction, Star, Trajectory.

For abstract, see STAR 05 20.
N67-34551 HC$3.00 MF$0.65

REPORT OF THE ASTRONOMER ROYAL FOR SCOTLAND FOR THE YEAR ENDING 31ST MARCH 1967.
Royal Observatory, Edinburgh (Scotland).
H. A. Bruck. 31 Mar 67, 20p

Descriptors: *Astronomical observatory, *Galaxy, *Photometry, *Spectroscopy, *Star, *Telescope, Artificial, Astronomical, Chemical, Composition, Dynamics, Gas, Light, Night, Observatory, Satellite, Seismology, Sky, Zodiac.

For abstract, see STAR 05 20.
N67-34871 HC$3.00 MF$0.65

3B. Astrophysics

CEPHEID PULSATIONS,
Joint Inst for Lab Astrophysics Boulder Colo
John P. Cox, and Arthur N. Cox. 1967, 9p
AROD-4445:86
Contract DA-31-124-ARO (D)-139, ARPA Order-0492
Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.
Availability: Published in Sky and Telescope v33 n5 p3-7 May 1967.

Descriptors: (*Variable stars, Reviews), Periodic variations, Light, Hydrodynamics, Brightness, Gravity, Heat transfer, Models (Simulations).
Identifiers: Cepheid variables.

The pulsations of Cepheid variable stars are discussed. The linear adiabatic assumptions are contrasted with the nonlinear nonadiabatic theory. The authors have carried out integrations of the correct nonlinear nonadiabatic equations of mass, momentum, and energy conservation on computers, and have traced the changes through time of up to 50 mass shells inside a Cepheid. For the first time, the details of the internal variations are shown for oscillations having amplitudes as great as those that occur in real stars. (Author)
AD-657 540 Not available from CFSTI.

THE LUNAR SURFACE LAYER,
Air Force Cambridge Research Labs L G Hanscom Field Mass
John W. Salisbury, and Vern G. Smalley. 1964, 24p
Availability: Published in Lunar Surface 24p 1964.

Descriptors: (*Moon, *Dust), Surface properties, Physical properties, Infrared spectroscopy, Thermal properties, Emissivity, Temperature, Silicates, Thermal conductivity, Electromagnetic waves, Thickness, Measurement, Terrain.

Direct and indirect evidence for the nature of lunar surface materials are examined and compared with theoretical predictions. Conclusions are then drawn concerning the most probable character of these materials. It is concluded that the lunar surface is covered with a layer of rubble of highly variable thickness and block size. The rubble in turn is mantled with a layer of highly porous dust which is thin over topographic highs, but thick in depressions. The dust has a complex surface and significant, but not strong, coherence. (Author)
AD-657 607 Not available from CFSTI.

RADIATIVE CAPTURE OF 3He BY 3He,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 20H.
AD-657 619 HC$3.00 MF$0.65

THE CALCULATION OF MODEL STELLAR ATMOSPHERES,
Princeton Univ N J Observatory
Dimitri Mihalas. 1967, 53p
AFOSR-67-1955
Contract AF 49 (638)-1555
Availability: Published in Methods in Computational Physics v7 p1-52 1967.

Descriptors: (*Stars, *Atmosphere models), Thermodynamics, Astrophysics, Density, Dissociation, Pressure, Specific heat, Temperature, Convection (Atmospheric), Hydrogen, Mathematical analysis.

Contents: Introduction; Basic equations and assumptions; Physical and thermodynamic variables; Integration of the pressure equation; Solution of the transfer equation; Determining the temperature distribution; Line-blanketing effects; Convection; Prospects.
AD-657 653 Not available from CFSTI.

STATISTICAL-EQUILIBRIUM MODEL ATMOSPHERES FOR EARLY-TYPE STARS. I. HYDROGEN CONTINUA,
Princeton Univ N J Observatory
Dimitri Mihalas. 21 Nov 66, 25p
AFOSR-67-1962
Contract AF 49 (638)-1555
Availability: Published in Astrophysical Journal v149 p169-90 Jul 1967.

Descriptors: (*Stars, *Atmosphere models), Temperature, Gravity, Hydrogen, Thermodynamics, Line spectrum, Helium, Ionization, Atomic energy levels, Mathematical analysis.

Model atmospheres have been constructed for selected effective temperatures and gravities appropriate to early-type stars, allowing in an approximate way for deviations from LTE in the first ten bound states of hydrogen. The essential approximation involved is the assumption of radiative detailed balance in the lines, which seems valid in the region of continuum formation. The resulting models are thought to be adequate for interpretation of the observed energy distribution of stars but cannot be used for discussions of line profiles. We find that the deviations from LTE are quite small and that the predicted fluxes agree closely with those of LTE models. (Author)
AD-657 655 Not available from CFSTI.

SPECTROPHOTOMETRY OF NEW SHORT-PERIOD VARIABLE STARS.
Revised ed.,
Palomar Observatory Pasadena Calif
I. J. Danziger, and R. J. Dickens. 24 Jan 67, 20p
AFOSR-67-2024
Contract AF 49 (638)-1323
Revision of manuscript submitted 13 Dec 66. Prepared in cooperation with Mount Wilson Observatory, Pasadena, Calif., Carnegie Institution of Washington, D. C., and Carnegie Inst. of Tech., Pittsburgh, Pa.
Availability: Published in Astrophysical Journal v149 n1 p55-72 Jul 1967.

Descriptors: (*Stars, Spectrophotometers), (*Astronomical observatories, Stars), Velocity, Light, Intensity, Photoelectric materials, Gravity, Rotation, Astrophysics, Tables.

The occurrence of short-period variability in a number of bright F-type stars was discovered during an extensive program of UBV photoelectric observations made between October, 1965, and February, 1966. The amplitudes of the new variables are small and change in the manner shown by some of the variables of the delta Sct type. Observations of the continua of the new variables were made by measuring the intensities at twenty-five discrete wavelengths between about 3300 and 10000 A using a photoelectric spectrum scanner. Coude spectra at 10 A/mm were used to correct the intensities for line-blanketing effects, and the resulting continua were then compared with the model atmospheres of Mihalas to yield effective temperatures and surface gravities. Some of the new variables have higher temperatures and gravities than the previously known variables. Higher values of the projected rotational velocity V sin i also occur, and indicate that in this region of the H-R diagram pulsation is not incompatible with rapid rotation. More than half the stars appear to be significantly undermassive for normal left-to-right evolution in the H-R diagram, for which masses approximately equals 1.8 M sum (rotation) are typical. Some of the variables, particularly rho Pup and HR 5017, have extremely low values of the pulsation constant Q. The stars of lowest mass are consistently cooler than those of higher mass, an effect that is observable in a correlation obtained between log g and log Te. (Author)
AD-657 717 Not available from CFSTI.

A RADIO SURVEY OF THE REGION OF NGC 6781,
Arecibo Ionospheric Observatory Puerto Rico
For primary bibliographic entry see Field 3A.
AD-657 721 Not available from CFSTI.

CHEMICAL KINETICS OF ENTRY INTO THE MARTIAN ATMOSPHERE.
Technical rept. (Final),
Ohio State Univ Columbus Aeronautical and Astronautical Research Labs
E. Stokes Fishburne, K. R. Bilwakesh, and Rudolph Edse. May 67, 47p Rept no. TR-6
ARL-67-0113
Contract AF 33 (657)-8951

Descriptors: (*Planetary atmospheres, *Mars (Planet)), (*Carbon dioxide, Chemical reactions), Atmosphere entry, Kinetic theory, Shock tubes, Shock waves, Carbon monoxide, Oxygen, Mixtures, Computer programs, Infrared radiation, High-temperature research, Water vapor, Hydrogen, Moisture, Supersonic nozzles.

The reactions between carbon monoxide and oxygen to form carbon dioxide have been examined in two separate experimental studies. In the first study a mixture of carbon monoxide and oxygen was introduced into a shock tube. The mixture then was heated by a shock wave and the rate of formation of carbon dioxide was determined. The carbon dioxide concentration was followed by ob-

serving the intensity of the infrared radiation at 4.25 mu emitted by the heated carbon dioxide. Rate constants were obtained. However, it was shown that if the amount of water vapor in the system was greater than 7 ppm the primary reactions were governed by the hydrogen-oxygen system of reactions. Hence, it was impossible to obtain reliable rate constants for the CO-O2 system of reactions. The elimination of such minute quantities of moisture is almost impossible. The second experimental study involved expanding a high temperature mixture of CO2, CO, O, and O2 through a supersonic expansion nozzle. From a measurement of the pressure profile down the nozzle the chemical state of the gas can be determined. Extensive computer programs were formulated for this phase of the investigation. Unfortunately the contract period came to an end at the conclusion of the calibration experiments. Hence, no information was obtained concerning the recombination of carbon dioxide.
AD-657 778 HC$3.00 MF$0.65

WKB APPROXIMATION IN THREE DIMENSIONS.
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
For primary bibliographic entry see Field 20J.
AD-657 883 Not available from CFSTI.

PHENOMENOLOGICAL LIMITS ON THE ABSORBING REGIONS OF QUASI-STELLAR SOURCES.
Revised ed.,
California Inst of Tech Pasadena
John N. Bahcall. 31 May 67. 3p
Contract Nonr-220 (47), Grant NSF-GP-5391
Revision of manuscript submitted 1 Feb 67.
Availability: Published in The Astrophysical Journal v149 pL7-L9 Jul 1967.

Descriptors: (*Absorption spectrum, Stars), (*Continuous spectrum, Sources), Particles, Excitation, Photons, Density, Carbon, Spectra (Infrared), Spectra (Visible + ultraviolet), Electrons, Scattering, Detection, Silicon, Sulfur.

The purpose of this Letter is to show how an analysis of the absorption lines in a quasi-stellar source can be used to obtain estimates of either (i) the particle density in the absorbing region or (ii) the distance between continuum source and absorber. We present first the implications of the observed fine structure in the Si II absorption lines and then discuss the implications of absorption lines arising from metastable states of C III and S II. Three explanations are available for the population of the excited fine-structure states: (i) particle collisions; (ii) direct excitation by infrared photons; and (iii) indirect excitations via ultraviolet transitions to highly excited states that subsequently decay to the ground fine-structure states. (Author)
AD-657 975 Not available from CFSTI.

DIFFERENTIAL ROTATION AND THE SOLAR OBLATENESS.
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 3C.
AD-657 986 Not available from CFSTI.

SOLAR NEUTRINOS FROM THE PROTON - HELIUM THREE REACTION.
Revised ed.,
Catholic Univ of America Washington D C
Carl Werntz, and J. G. Brennan. 19 Jan 67. 6p
AFOSR-67-2093
Grant AF-AFOSR-566-66
Revision of manuscript submitted 20 Oct 66.
Availability: Published in Physical Review v1 n4 p759-63 May 20 1967.

Descriptors: (*Neutrinos, *Sun), Positrons, Helium, Protons, Boron, Nuclear cross sections, Wave functions, Selection rules, Nuclear spins, Mesons, Nuclear reactions.

The paper gives a new estimate of the cross section for the reaction 3He (p, et, nu)4He. It is concluded that this reaction is probably an insignificant source of neutrinos in the sun.
AD-658 265 Not available from CFSTI.

THE EARTH'S BOW SHOCK WAVE.
Revised ed.,
Harvard Radio Astronomy Station Fort Davis Tex
D. A. Tidman. 12 Dec 66, 14p Rept no. Scientific-2
AFCRL-67-0341
Contract AF 19 (628)-5744
Revision of manuscript submitted 6 Oct 66.
Availability: Published in Journal of Geophysical Research v72 n7 p1799-1808 Apr 1 1967.

Descriptors: (*Solar wind, Shock waves), Plasma medium, Stability, Turbulence, Terrestrial magnetism, Mathematical models, Electrons, Ions, Whistlers.

A model for a strong plasma shock wave with a structure determined by ion wave instabilities has been developed. The magnetic field structure of the shock wave is further investigated and found to have many features in agreement with satellite observations of the earth's bow shock. A significant test for this model would be to observe the plasma density to jump through the bow shock on a length scale that is sometimes less than the thickness LB of the shock jump in the average magnetic field. It is also pointed out that the earth's bow shock may have a variable structure ranging from a thin ion-wave shock to relatively thick hydromagnetic shocks as conditions in the solar wind vary. (Author)
AD-658 349 Not available from CFSTI.

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-658 392 HC$3.00 MF$0.65

ORBITAL FLUX INTEGRATIONS WITHIN THE SUBSYNCHRONOUS REGIONS OF THE GEOMAGNETIC CAVITY, PART I.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. G. Stassinopoulos. Mar 67, 18p NASA-TM-X-55875, X-641-67-359

Descriptors: *Code, *Computer method, *Orbiting satellite, *Particle flux, *Trapped particle, Calculation, Cavity, Circle, Component, Computer, Decay, Effect, Electron, Ellipticity, Environment, Field, Fish, Flux, Geomagnetic, Intensity, Method, Model, Omnidirectional, Orbit, Particle, Proton, Satellite, Solar, Space, Star, Trajectory, Trap, Vehicle.

For abstract, see STAR 05 20.
N67-34158 HC$3.00 MF$0.65

SEARCH FOR COSMIC GAMMA RADIATION WITH A VIDICON SPARK CHAMBER FINAL REPORT.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
S. J. Cavrak, Jr., G. G. Fazio, D. R. Hearn, and H. F. Helmken. 1967. 15p NASA-CR-87420
Contract NSR-09-015-022
Presented At the 10th Intern. Conf. on Cosmic Rays, Calgary, Canada, 19 Jun. 1967

Descriptors: *Cosmic radiation, *Gamma radiation, *Spark chamber, *Vidicon, Balloon, Chamber, Cosmic, Crab nebula, Energy, Flare, Flux, Gamma, High altitude, Quiet, Radiation, Search, Solar, Spark, Spectrum, Sun.

For abstract, see STAR 05 20.
N67-34299 HC$3.00 MF$0.65

PROJECT TECH TOP STUDY OF LUNAR, PLANETARY AND SOLAR TOPOGRAPHY FINAL REPORT.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
R. O. Breault, J. D. Gallatin, and D. A. Richards. Jul 67, 350p NASA-CR-85008, VC-2104-D-2
Contract NAS12-19

Descriptors: *Data acquisition, *Lunar topography, *Planetary surface, Acquisition, Data, Engineering, Flare, Fourier transform, Imagery, Laser, Lunar, Mapping, Planetary, Probe, Sensor, Solar, Spectroscopy, Surface, Topography.

For abstract, see STAR 05 20.
N67-34542 HC$3.00 MF$0.65

PRELIMINARY INVESTIGATION OF A LUNAR "ROLLING STONE".
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
W. H. Arant, J. M. Eggleston, A. W. Patteson, D. L. Spooner, and J. E. Throop. Mar 67, 14p
NASA-TM-X-58007
Contract 914-50-89-00-72

Descriptors: *Lunar orbiter, *Lunar surface, *Physical property, *Rock, Analysis, Bearing, Crater, Dimension, Lunar, Photography, Physical, Property, Rolling, Strength, Surface, Wall.

For abstract, see STAR 05 20.
N67-34631 HC$3.00 MF$0.65

ELECTRONICS FOR A MARTIAN WATER VAPOR DETECTION SYSTEM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 20.
N67-34759 HC$3.00 MF$0.65

FLYBY MEASUREMENTS OF THE PROFILES OF WATER VAPOR, PARTICULATE MATTER, AND CARBON DIOXIDE IN THE MARTIAN ATMOSPHERE.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
A. E. Barrington, A. J. Caruso, and G. G. Mannella. Aug 67, 16p NASA-TN-D-4115
Contract 185-47-26-01-25

Descriptors: *Carbon dioxide, *Flyby mission, *Infrared spectroscopy, *Mars atmosphere, *Water vapor, Absorption, Attenuation, Carbon, Determination, Dioxide, Flyby, Infrared, Instrumentation, Matter, Measurement, Mission, Particle, Profile, Scattering, Spectroscopy, Theory, Vapor, Water.

For abstract, see STAR 05 20.
N67-34884 HC$3.00 MF$0.65

GRAVITATIONAL COLLAPSE OF LARGE MASSES AND RELATED PROBLEMS.
Sul Collasso Gravitazionale Di Grandi Masse E Problemi Collegati
Consiglio Nazionale Delle Ricerche, Frascati (Italy). Centro Studi Di Astrofisica.
A. Renzini. 1967. 11p
in Italian, English Summary Presented At the 10th Meeting of the Ital. Astron. Soc., Catania, Sicily, 27-29 Jun. 1966

Descriptors: *Energy transfer, *Gravitational collapse, *Numerical analysis, *Symmetrical body, Analysis, Body, Collapse, Emission, Energy,

Equation, Flow, Gravitational, Mass, Numerical, Quasar, Radial, Spherical, Symmetry, Total, Transfer, Travel.

For abstract, see STAR 05 20.
N67-34947 HC$3.00 MF$0.65

PROBLEMS OF ASTROPHYSICS.
National Aeronautics and Space Administration, Washington, D. C.
YE. P.Fedorov. Aug 67, 172p NASA-TT-F-455
Transl. into English of the Book "voprosy Astrofiziki" Kiev, Izd. Naukova Dumka, 1966 P 1-205

Descriptors: *Astrophysics, *Galaxy, *Solar radiation observation, *Star cluster, Chromosphere, Emission, Excitation, Flare, Hydrogen, Luminescence, Observation, Photosphere, Plasma, Prominence, Radiation, Solar, Spectrophotometry, Sunspot.

For abstract, see STAR 05 20.
N67-35042 HC$3.00 MF$0.65

MULTIDISCIPLINARY RESEARCH LEADING TO UTILIZATION OF EXTRATERRESTRIAL RESOURCES ANNUAL STATUS REPORT, FISCAL YEAR 1967.
Bureau of Mines, Minneapolis, Minn. Twin Cities Mining Research Center.
For primary bibliography entry see Field 22A
For abstract, see STAR 05 20.
N67-35071 HC$3.00 MF$.065

QUASARS AND COSMOLOGY.
Max-planck-institut Fur Physik Und Astrophysik, Munich (West Germany).
P. Kafka. May 67, 25p MPI-PAE/ASTRO-2/67

Descriptors: *Quasi-stellar radio source (qso), *Red shift, *Space-time function, *Stellar luminosity, Algebra, Analysis, Astronomy, Correlation, Distribution, Function, Luminosity, Matrix, Model, Optics, Radio, Red, Shift, Source, Space, Stellar, Time.

For abstract, see STAR 05 20.
N67-35074 HC$3.00 MF$0.65

COMETS IN THE SOLAR WIND.
Kometen Im Sonnenwind
Max-planck-institut Fur Physik Und Astrophysik, Munich (West Germany).
B. Brosowski, and H. U. Schmidt. May 67, 11p MPI-PAE/ASTRO-1/67

Descriptors: *Comet, *Cosmic plasma, *Solar wind, Calculation, Change, Charge, Cosmic, Electron, Flow, Impact, Interaction, Ionization, Model, Plasma, Shock, Solar, Wind.

For abstract, see STAR 05 20.
N67-35165 HC$3.00 MF$0.65

THE HAYSTACK- MILLSTONE INTERFEROMETER SYSTEM.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
A. E. Rogers. 15 Mar 67, 48p NASA-CR-84615, TR-457
Grant NSG-419, Contract DA-36-039-AMC-03200/E/

Descriptors: *Galactic radiation, *Interferometer system, *Microwave interferometer, Antenna, Aperture, Correlator, Coupling, Design, Digital, Galaxy, High resolution, Hydroxyl, Interferometer, Line, Microwave, Noise, Radiation, Servocontrol, System, Transmission.

For abstract, see STAR 05 20.
N67-35172 HC$3.00 MF$0.65

PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966,
Oak Ridge National Lab., Tenn.
P. H. Stelson. May 67, 175p
Contract W-7405-eng-26

Descriptors: (*Neutron cross sections, *Nuclear reactions), Gamma rays, Radium, Fission, Protons, Excitation, Fast neutrons, Charged particles.

For abstract, see NSA 21 17.
ORNL-4082 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 14B.
PB-176 006 HC$3.00 MF$0.65

3C. Celestial Mechanics

DIFFERENTIAL ROTATION AND THE SOLAR OBLATENESS.
Technical rept.,
Princeton Univ N J Palmer Physical Lab
R. H. Dicke, and H. Mark Goldenberg. 8 May 67, 5p
Contract Nonr-1858 (30)
Availability: Published in Nature v214 n5095 p1294-6 Jun 24 1967.

Descriptors: (*Planets, Rotation), (*Mercury (Planet), Solar systems), Turbulence, Spectroscopy, Shear stresses, Polynomials, Velocity, Atmosphere, Temperature, Sun, Theory.

Dr I. W. Roxburgh questioned an earlier argument by Professor R. H. Dicke that the observed flattening of the Sun would account for part of the rotation of the orbit of Mercury otherwise attributable to general relativity. Roxburgh advanced arguments which suggest that the surface of the Sun may not be an equipotential surface, largely because of turbulence in the atmosphere. Dicke now rejects this interpretation. (Author)
AD-657 986 Not available from CFSTI.

ON THE THIRD INTEGRAL OF THE GALAXY,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
C. L. Goudas. Aug 67, 29p Rept no. D1-82-0634, Mathematical note-522

Descriptors: (*Celestial mechanics, Integrals), Hamiltonian, Equations of motion, Dynamics, Periodic variations, Convergence, Orbital trajectories.

It is shown here that the 'third integral' of the galaxy, whenever its constant is conserved, defines the same surface as the Hamiltonian, and thus does not constitute any new integral, but a function of the already known integral of energy. In particular, the 'third integral' and the Hamiltonian are found to possess collinear gradients, in accordance with Poincare's theorem concerning the characteristic exponents in systems with multiple integrals. (Author)
AD-658 162 HC$3.00 MF$0.65

THE PRECESSION AND NUTATION OF DEFORMABLE BODIES. IV. DEFORMATION OF SELF-GRAVITATING ELASTIC SOLIDS,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
Zdenek Kopal. Aug 67, 58p Rept no. D1-82-0636, Mathematical Note-524
Contract NASw-1470
See also AD-657 400.

Descriptors: (*Celestial mechanics, Oscillation), (*Deformation, Solids), Stresses, Strain (Mechanics), Gravity, Equations of motion, Fluid dynamic properties, Compressive properties.

The report derives the explicit form of equivalent equations which govern the deformations of self-gravitating elastic bodies of non-uniform internal temperature, whose dynamical behavior is characterized by variable Lame parameters lambda and mu. Special respect will be paid to small deformations (or oscillations) about the state of hydrostatic equilibrium, characterized by spheroidal or toroidal symmetry.
AD-658 212 HC$3.00 MF$0.65

NEW INTEGRALS OF MOTION AND THE ORBITAL HISTORY OF THE MOON,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
C. L. Goudas. Aug 67, 17p Rept no. D1-82-0633, Mathematical Note-521

Descriptors: (*Moon, Motion), Momentum, Gravity, Dissipation factor, Orbital trajectories, N-body problem, Rotation, Tides, Reviews.

A discussion of the orbital past of the Moon is presented here, taking into account gravitational and dissipative forces. (Author)
AD-658 220 HC$3.00 MF$0.65

BURRAU'S PROBLEM OF THREE BODIES,
Yale Univ New Haven Conn Observatory
Victor Szebehely. 12 May 67, 9p
AFOSR-67-2160
Grant AF-AFOSR-397-67
Availability: Published in Proceedings of the National Academy of Sciences v58 n1 p60-5 Jul 1967.

Descriptors: (*N-body problem, Celestial mechanics), Motion, Velocity, Dynamics, Binary stars, Stars, Gravity, Initial value problems, Momentum, Periodic variations.

A complete solution of the general two-dimensional problem of three bodies is described in this paper in detail. It is shown that in the beginning of time the dynamical system forms a Pythagorean triangle. The initial velocities are zero. During the development of the dynamical system there are several close approaches. The final development of the system consists of a binary and an escaping star. (Author)
AD-658 357 Not available from CFSTI.

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-658 392 HC$3.00 MF$0.65

SOLUTION OF BIRKHOFF'S EQUATIONS OF THE REGULARIZED RESTRICTED PROBLEM,
Yale Univ New Haven Conn Observatory
Carol Williams. 12 Aug 66, 9p
AFOSR-67-2162
Grant AF-AFOSR-397-67
Research supported in part by Nonr.
Availability: Published in Astronomical Journal v71 n10 p976-82 Dec 1966.

Descriptors: (*N-body problem, Orbital trajectories), Initial value problems, Equations of motion, Power series, Mathematical analysis.

The restricted problem of three bodies is treated using the regularizing variables of Birkhoff. The solution of the equation of motion is represented by a power series in the regularizing time variable, with coefficients depending on the initial conditions. Coefficients are given to the fourth order for a collision orbit. A method for generalizing to

any order with arbitrary initial conditions is offered. Some applications of the general results are pointed out; however, the question of convergence is not discussed. The development is closely related to that given by Szebehely in this issue. (Author)
AD-658 415 Not available from CFSTI.

SYNTHESIS OF THE ANALYTICAL RESULTS OF OPTIMAL TRANSFERS BETWEEN KEPLERIAN ORBITS (TIME-FREE CASE).
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 20.
N67-35177 HC$3.00 MF$0.65

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

TURBULENT SHOCK WAVES IN PLASMAS,
Harvard Radio Astronomy Station Fort Davis Tex
D. A. Tidman. 6 Sep 66, 22p Rept no. Scientific-1 AFCRL-67-0340
Contract AF 19 (628)-5744, Grant NsG-220-62
Availability: Published in Physics of Fluids v10 n3 p547-64 Mar 1967.

Descriptors: (*Plasma medium, *Shock waves), (*Magnetosphere, Shock waves), Turbulence, Leading edge, Magnetic fields.

A model for a turbulent shock wave with a structure determined by ion wave instabilities is discussed. Quasi-linear theory for spatially growing waves is used to examine the spatial buildup of the turbulent spectrum in the leading edge of the shock transition. Although the principal calculations are made for an electrostatic shock, the response of a weak magnetic field in the plasma to such a thin ion-wave shock is also discussed. It is suggested that the earth's bow shock in the supersonic solar wind may sometimes have a structure of the type described and a comparison with satellite data for this shock wave is made. (Author)
AD-657 534 Not available from CFSTI.

OPTICAL SOUNDING III.
Final rept. 1 Apr 66-30 Mar 67,
New York Univ N Y Geophysical Sciences Lab
R. M. Schotland, James Bradley, and Alan Nathan. Jun 67, 38p Rept no. 67-2 ECOM-02207-F
Contract DA-28-043-AMC-02207 (E)
See also AD-643 562.

Descriptors: (*OPDAR, *Atmospheric sounding), Water vapor, Lasers, Humidity, Ruby, Aerosols, Rayleigh scattering, Density, Telluric currents, Equations, Absorption, Particles, Atmospheric temperature.

Studies have been conducted utilizing simulated data of a ruby laser radar to study atmospheric water vapor profiles. Transfer equations have been evaluated incorporating 20 water vapor lines near 6943A. It is shown that the 6943.815A line stands essentially isolated in the telluric spectrum. An analysis is presented of the uncertainties in the deduced water profile obtained for simulated data based upon the 6943.815A line. It is shown that for the present laser radar, the uncertainty in the deduced water vapor density originated primarily in the uncertainty associated with the water vapor absorption coefficient. The Doppler-broadening of radiation scattered from aerosol particles or by Rayleigh scattering processes does not obey the spectral density shape predicted from the Maxwell-Boltzmann distribution of velocities for the particles or air molecules. As Dicke has pointed out, spectral narrowing can occur due to collisions. This phenomenon is discussed in relation to the Doppler spectrum of scattered radiation. The conclusions have been confirmed in experiments reported in the literature. (Author)
AD-657 601 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE INFRARED ABSORPTION BY ATMOSPHERIC GASES.
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
For primary bibliographic entry see Field 7D.
AD-657 614 HC$3.00 MF$0.65

ABSORPTION BY H2O BETWEEN 5045 - 14,485/cm (0.69-1.98 MICRONS).
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
For primary bibliographic entry see Field 7D.
AD-657 629 HC$3.00 MF$0.65

NO + O CHEMILUMINESCENT REACTION USING ADIABATICALLY EXPANDED NITRIC OXIDE,
Aerochem Research Labs Inc Princeton N J
For primary bibliographic entry see Field 7E.
AD-657 657 Not available from CFSTI.

IODINE, BROMINE, AND CHLORINE IN WINTER AEROSOLS AND SNOW FROM BARROW, ALASKA,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
Robert A. Duce, John W. Winchester, and Theodore W. Van Nahl. 8 Oct 65, 12p
Contract Nonr-1841 (74)
Availability: Published in Tellus v18 n2 p238-47 1966.

Descriptors: (*Air pollution, Alaska), Iodine, Bromine, Chlorine, Aerosols, Snow, Periodic variations, Sea water, Neutron activation, Aircraft, Ice, Sampling, Atmosphere, Polar regions.

Iodine, bromine, and chlorine have been determined in atmospheric aerosols and in snow collected in Barrow, Alaska, during January, 1965, by means of neutron activation analysis. Aerosols collected using both an aircraft collector by impaction and a ground-based 1.0 micron Type EA Millipore filter collector show concentrations of Cl to be much more variable than either Br or I, and I/Br points cluster at 0.1-0.2 gI/gBr for the filter samples. Cl varies from <0.02 to 4 microgram Cl/cu m STP in the filter samples, and the aircraft concentrations agree with those taken by filter on the same days. Filter Br is 1-30 ngBr/cu m STP and I is 0.3-10 ngI/cu m STP, and the ratios I/Cl and Br/Cl increase sharply with decreasing Cl. Snow samples from the ground have Br/Cl somewhat greater than in sea water, although all halogen concentrations decrease with increasing distance from the sea up to 10 km. Assuming a mixture of undifferentiated sea salt and a more permanent atmospheric component, we estimate for the atmospheric component in the snows I/Br nearly equal to 0.2. Sea water, sea ice, and related samples were analyzed, and I/Cl = 0.000004 gI/gCl is normal for sea water, although Br/Cl = 0.0038 gBr/gCl stands a little high. (Author)
AD-657 724 Not available from CFSTI.

LEAD AND HALOGENS IN POLLUTION AEROSOLS AND SNOW FROM FAIRBANKS, ALASKA,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
John W. Winchester, William H. Zoller, Robert A. Duce, and Carl S. Benson. 4 Oct 66, 16p
Contract Nonr-1841 (74)
Prepared in cooperation with Alaska Univ.
Availability: Published in Atmospheric Environment v1 p105-19 1967.

Descriptors: (*Snow, Alaska), (*Air pollution, *Aerosols), Lead compounds, Halogens, Polarographic analysis, Atmosphere, Particles, Fuels, Temperature, Contamination, Neutron activation, Bromine, Oxidation.

The composition of lead halide pollution aerosol particles was studied in the Fairbanks area during January and February 1965. At this time of year the sun is above the horizon for less than 4 hr and prolonged cold spells (surface air temperature below -40C) are accompanied by strong (gradients of 20-30C/100 m) surface inversions which severely restrict the dilution volume for air pollutants. Indeed, these inversions virtually decouple the dense surface air-layer from the overlying air. Accurate quantitative information on the total output of all pollution sources is available because of the isolated location of Fairbanks and the limited, measurable sources of fuel supply. Thus, Fairbanks is a model locality for studying the production, movement, and chemical reactions of air pollutants in what amounts to a simple two-layer atmosphere. Lead was determined by inverse polarography in aerosol particles collected on Millipore filters. Measured values ranged from 6.0 micrograms of lead/cu m of air in the city center, near the automobile traffic center, to 0.19 at the University of Alaska campus outside the city. These do not represent maximum values because pollutant-concentrating conditions were relatively mild during the sampling periods. Halogens were determined by neutron activation analysis of material in the aerosols and in ground-lying snows, and two components were revealed, a pollution component derived from automotive ethyl fluid combustion and a low-level natural component. The smaller particles, because of greater surface area per unit mass, may suffer the most extensive bromine loss and may migrate farthest from the city center by virtue of their long atmospheric residence time. (Author)
AD-657 726 Not available from CFSTI.

COHERENCE OF IODINE AND BROMINE IN THE ATMOSPHERE OF HAWAII, NORTHERN ALASKA, AND MASSACHUSETTS,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
John W. Winchester, and Robert A. Duce. 8 Oct 65, 7p
Contract Nonr-1841 (74)
Availability: Published in Tellus v18 n2 p287-92 1966.

Descriptors: (*Air pollution, *Iodine), (*Bromine, Air pollution), Aerosols, Halogens, Particles, Sea water, Ice, Snow, Particle size, Chemical precipitation, Hawaii, Alaska, Massachusetts.

Previously reported analyses of rain, snow, aerosols, and gas from Hawaii, Alaska, and Massachusetts, and new analyses of Antarctic and Alaska snow and ice, are compared. Both I and Br appear to be associated with aerosols of smaller particle sizes and longer residence times than Cl-rich aerosols. In most suites of samples there is a clustering at I/Br approximately equals 0.1-0.2, and Br/Cl exceeds the sea water ratio (3.4 x 0.001) several-fold. Aerosols collected over open sea water in Hawaii, however, show Br/Cl several-fold lower than in sea water. The latter particles are identified as 'sea salt' aerosols whereas the Br-rich aerosols are smaller in size and may be basically different in composition, e.g. ammonium sulfate as discussed by JUNGE (1963). It is suggested that Br is 'distilled' from the sea spray droplets, possibly by photochemical oxidation to Br2, and then 'condensed' onto the smaller particles, possibly by participating in the oxidation of SO2 to sulfate. Iodine may engage in similar reactions, and the resulting I and Br-rich particles exhibit a worldwide constancy in I/Br. Precipitation analyses show a similar constancy in I/Br. (Author)
AD-657 727 Not available from CFSTI.

CHEMICAL KINETICS OF ENTRY INTO THE MARTIAN ATMOSPHERE.
Ohio State Univ Columbus Aeronautical and Astronautical Research Labs
For primary bibliographic entry see Field 3B.
AD-657 778 HC$3.00 MF$0.65

ELECTROMAGNETIC WAVE PROPAGATION AND THE UPPER ATMOSPHERE.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20N.
AD-658 005 HC$3.00 MF$0.65

A SUMMARIZATION OF TECHNICAL AND SCIENTIFIC REPORTS ISSUED BY THE IONOSPHERE RESEARCH LABORATORY - PAPERS PRESENTED AND PUBLISHED - SUBSEQUENT TO SCIENTIFIC REPORT NO. 200,
Pennsylvania State Univ University Park Ionosphere Research Lab
A. H. Waynick. 30 Jun 67, 259p Rept no. Scientific-300
AFCRL-67-0466
Contract AF 19 (628)-4014

Descriptors: (*Ionosphere, Reports), Scientific research, Radio waves, Charged particles, Electron density, Magnetohydrodynamics, Diffusion, Mass spectroscopy, Spectrum analyzers, Reflection, Rocket research, Electromagnetic waves, Plasma physics, Magnetosphere, Electric fields, Least squares method.

The report is a sequel to Scientific Report No. 200 and, as such, is a continuation of the summarization of the scientific report output and paper presentation and publication by the Laboratory staff to date. The report is divided into three major sections. The first of these contains the title, author (s) and date of issuance of Scientific Reports numbers 200 through 299. Where appropriate, the abstracts and conclusions of the reports are included. The second section is a listing by title, author and other relevant information concerning papers presented at technical and scientific meetings during the interval February 1964 through June 1967. The third section comprises reference material on paper publications during the interval November 1963 through May 1, 1967. (Author)
AD-658 006 HC$3.00 MF$0.65

IONOSPHERIC RESEARCH.
Final rept., 1 Apr 64-30 Jun 67,
Pennsylvania State Univ University Park Ionosphere Research Lab
Thomas A. Seliga. 30 Jun 67, 43p
AFCRL-67-0425
Contract AF 19 (628)-4050
See also AD-650 694.

Descriptors: (*Ionosphere, Reports), Scientific research, Electromagnetism, Radio transmission, Rocket research, Conductivity, Instrumentation, Measurement, Analysis.

The Statement of Work for the research to be performed under Contract AF 19 (628)-4050 called for research directed toward the investigation of the lower ionosphere. Specific emphasis was placed on the design, conduction and analysis of rocket-borne A. C. conductivity probes and radio wave propagation experiments. These objectives have formed the basis for the studies outlined in this report. As stated in Section I, the present contract has been one of related efforts underway in the Ionosphere Research Laboratory during the period of interest. It is a continuation of Part B of the original contract (AF19 (604)-8012), pertaining to D and lower E-region rocket measurements. Following certain introductory material an outline of each investigation performed under the contract is given. These are related to former efforts described in the Final Report for Contract AF 19 (604)-8012. The problems outlined fit under the broad categories of electromagnetic theory studies, ionospheric phenomena, ground based and rocket equipment development and the physics of ionospheric formation. A listing of the reports issued and in preparation, paper publications and presentations, and similar matters comprises Section III of the report. A listing of the personnel that were actively employed in this work is given in Section IV. The report is concluded with an Appendix containing the abstracts of Scientific Reports issued by the Laboratory under the support provided by this contract. (Author)
AD-658 040 HC$3.00 MF$0.65

MESOSPHERIC OZONE MEASUREMENTS DURING A SOLAR ECLIPSE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Jagir S. Randhawa. Jun 67, 22p
ECOM-5131

Descriptors: (*Ozone, Mesosphere), (*Solar eclipses, Ozone), Meteorological instruments, Rockets, Solar radiation, Chemiluminescence, Measurement, Stratosphere.

A rocket-borne ozonesonde has been developed which utilizes the chemiluminescent principle for the measurement of ozone concentration in the upper atmosphere. The sonde is deployed in the mesosphere by a small meteorological rocket (Arcas), and ozone concentration is measured as the instrument descends on a drag parachute. This instrument was flown during and before the total solar eclipse of 12 November 1966, at Tartagal (22 deg 32 min S, 63 deg 50 min W), Argentina, with the cooperation of scientists from that country. Ozone was monitored as the sonde passed through the total eclipse shadow between 60 and 54 km, and registered a higher concentration than the sounding made a day earlier at about the same time. A sudden decrease in the ozone concentration was noticed as the sonde emerged from the shadow of the total eclipse. Ozone concentration at 57 km during total solar eclipse was measured to be 3.7 x 0.001 cm/km as compared to 1.4 x 0.001 cm/km measured a day earlier at the same altitude. No marked effect on the ozone concentration in the upper stratosphere was noted during the partial eclipse conditions under which that region was observed. (Author)
AD-658 065 HC$3.00 MF$0.65

A TIDAL EXPERIMENT IN THE EQUATORIAL STRATOSPHERE OVER ASCENSION ISLAND (8S),
Atmospheric Sciences Lab White Sands Missile Range N Mex
Norman J. Beyers, and Bruce T. Miers. Jun 67, 24p
ECOM-5132

Descriptors: (*Atmospheric tides, Stratosphere), Temperature, Diurnal variations, Sounding rockets, Meteorology, Wind, Networks, Ascension Island.

Twenty-four meteorological rocket soundings were made from Ascension Island (7 deg 59 min S, 14 deg 28 min W) on 11-13 April 1966. In contrast to results obtained at White Sands Missile Range, New Mexico, the smoothed wind data did not display a consistent well-defined diurnal oscillation. However, results from the temperature data showed a significant diurnal variation. The time of maximum temperature ranged from 1400 LST at 36 km, to 1000 LST at 48 km, to near 1200 LST at 60 km. The maximum diurnal range was 12C at 44 and 60 km. Temperature results were in general agreement with the White Sands Missile Range data. (Author)
AD-658 066 HC$3.00 MF$0.65

MONTANA LASA LIGHTNING ACTIVITY FOR 1966,
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 14B.
AD-658 177 HC$3.00 MF$0.65

GAIN COMPENSATED PHOTOPOLARIMETER FOR AIRBORNE MEASUREMENTS OF SKY-LIGHT POLARIZATION,
California Univ Los Angeles Dept of Meteorology
For primary bibliographic entry see Field 14B.
AD-658 194 HC$3.00 MF$0.65

INVESTIGATION OF THE LOWER 300-METER LAYER OF THE ATMOSPHERE: SELECTED ARTICLES,
Foreign Technology Div Wright-Patterson AFB Ohio
A. K. Aleksandrova, N. L. Byzova, G. B. Mashkova, and Z. I. Volkovitskaya. 4 May 67, 63p
Rept no. FTD-MT-64-361
TT-67-62854
Trans. of mono. Issledovanie Nizhnego 300-Metrovogo Sloya Atmosfery, Moscow, 1963 p3-34.

Descriptors: (*Atmosphere, Reports), Wind, Meteorology, Diffusion, Velocity, Density, Temperature, Contamination, Turbulence, USSR.

Contents: Experiments on propagation of deposited impurity from point source in lower layer of atmosphere; On profiles of wind and characteristics of turbulent regime in the lower 300-meter layer of atmosphere; (Profiles of wind and temperature in surface layer of air, on profiles of wind and characteristics of the turbulent regime in the lower 300-meter layer of the atmosphere); Some results of measurements of horizontal diffusion of impurity in lower layer of atmosphere. (Author)
AD-658 244 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD DETERMINATION OF RADIATIVE PROPERTIES AND COMPOSITION OF THE ATMOSPHERE.
Final rept. 1 Mar 64-31 May 67,
Ohio State Univ Research Foundation Columbus
John H. Shaw, Dale Ford, and Josann Trusty. Apr 67, 94p Rept no. Scientific-3
AFCRL-67-0386
Contract AF 19 (628)-3806
Availability: Published in Various journals.

Descriptors: (*Ozone, Spectra (Infrared)), (*Nitrogen oxides, Spectra (Infrared)), (*Atmosphere, Optical properties), Interferometers, Spectrophotometers, Absorption spectrum, Band spectrum, Methane, Carbon monoxide, Atomic energy levels.

Contents: Reports of studies still in progress: Analysis of high-resolution spectra of NO near 5 microns; Design of Fabry-Perot interferometer; Installation and testing of model 521 spectrophotometer and digital data recorder; Multiple transversal absorption cell. Review of studies completed: Absorptance of NO fundamental at 5.3 microns; The infrared spectrum of ozone. Reprints of some published papers not included in previous scientific reports.
AD-658 292 Not available from CFSTI.

GEOMAGNETICALLY TRAPPED ALPHA PARTICLES.
Progress rept. for Jul 67,
Iowa Univ Iowa City Dept of Physics and Astronomy
S. M. Krimigis, and J. A. Van Allen. Jul 67, 74p
Rept no. 67-29
Contract Nonr-1509 (06), Grant NsG-233-62

Descriptors: (*Alpha particles, Magnetosphere), (*Scientific satellites, Van Allen radiation belt), Solar wind, Terrestrial magnetism, Protons, Deut-

erons, Magnetic storms, Cosmic rays, Detectors.
Identifiers: Injun 4.

This paper reports results of an extensive search for geomagnetically trapped nuclei heavier than deuterons in the energy range 0.52 < or = E < or = 4 MeV/nucleon, an energy region which is roughly two orders of magnitude below the regions previously investigated. The presence of geomagnetically trapped alpha particles was established. The significance of these observations lies in the fact that, although the intensity and energy spectrum of trapped protons E sub p approximately equal or > 30 MeV can be reasonably accounted for on the basis of the cosmic ray albedo neutron hypothesis, protons of energy below 30 MeV and down to 0.1 MeV or less cannot possibly be attributed to the albedo-neutron source. Thus, the special motivation for study of trapped nuclei having Z > or = 2 is to provide a set of parameters on one or more 'tracer' components of the radiation belts for testing the validity of hypotheses on their origin and on the origin of the much more abundant proton component.
AD-658 340 HC$3.00 MF$0.65

THE EARTH'S BOW SHOCK WAVE.
Harvard Radio Astronomy Station Fort Davis Tex
For primary bibliographic entry see Field 3B.
AD-658 349 Not available from CFSTI.

AURORAL AND ASSOCIATED MAGNETOSPHERIC PHENOMENA AT VERY HIGH LATITUDES.
European Space Research Organization, Paris (France).
Aug 67, 434p ESRO-SP-8
Proc. of Esro Colloq., Stockholm, 16-18 Nov. 1965

Descriptors: *Aurora, *Conference, *Magnetosphere, Activity, Field, Geomagnetic, High latitude, Ionization, Latitude, Measurement, Orbit, Phenomenon, Polar, Satellite.

For abstract, see STAR 05 20.
N67-34141 HC$3.00 MF$0.65

THE RESPONSE OF THE UPPER ATMOSPHERIC TEMPERATURE TO CHANGES IN SOLAR EUV RADIATION AND GEOMAGNETIC ACTIVITY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
S. Chandra, and B. V. Krishnamurthy. 1967, 22p
NASA-TM-X-60155

Descriptors: *Atmospheric heating, *Geomagnetic effect, *Solar radiation, *Ultraviolet radiation, *Upper atmosphere, Atmosphere, Atmospheric, Correlation, Drag, Effect, Geomagnetic, Heating, K index, Radiation, Satellite, Solar, Temperature, Ultraviolet, Upper, Variation.

For abstract, see STAR 05 20.
N67-34224 HC$3.00 MF$0.65

IONOSPHERIC DATA FOR NOVEMBER 1966 FROM SALISBURY, SOUTH AUSTRALIA.
Weapons Research Establishment, Salisbury (Australia).
Mar 67, 26p CPD-1966/11/S/

Descriptors: *Australia, *Diurnal variation, *Ionosphere, *Table, Atmospheric, Density, Diurnal, E layer, Electron, Frequency, Hour, Ionosonde, Radio, Sporadic, Variation, Velocity.

For abstract, see STAR 05 20.
N67-34279 HC$3.00 MF$0.65

IONOSPHERIC RESEARCH USING SATELLITES SUMMARY REPORT, 17 NOV. 1965 - 17 NOV. 1966.
University Coll., Nairobi (Kenya). Dept. of Physics.
A. N. Hunter, and A. R. Webster. 21 Nov 66, 44p
SR-1, AFCRL-67-0284
Contract AF 61/052/-909

Descriptors: *Be-c, *Electron density, *Geomagnetic field, Africa, Be-b, Content, Data, Density, Electron, Error, Faraday rotation, Field, Geomagnetic, Ionosonde, Ionosphere, Latitude, Magnetic, Processing, Satellite, Scintillation, Table, Total, Variation.

For abstract, see STAR 05 20.
N67-34295 HC$3.00 MF$0.65

AN IDEALIZED PROBLEM WITH F2-LAYER APPLICATIONS.
Sheffield Univ. (England). Dept. of Applied Mathematics and Computing Science.
W. M. Pickering. 1967, 27p SR-8, AFCRL-67-0174
Contract AF-EOAR-64-74
Submitted for Publication

Descriptors: *Atmosphere model, *F- 2 layer, *Ionosphere, *Plasma flow, Air, Atmosphere, Coupling, Diffusion, Electron, Flow, Hall effect, Ion, Layer, Loss, Magnetic field, Model, Motion, Plasma.

For abstract, see STAR 05 20.
N67-34517 HC$3.00 MF$0.65

STUDIES OF THE AURORAL SUBSTORM. III CONCEPT OF THE MAGNETOSPHERIC SUBSTORM AND ITS RELATION TO ELECTRON PRECIPITATION AND MICROPULSATIONS.
California Univ., Berkeley. Space Sciences Lab.
F. V. Coroniti, R. L. Mc Pherron, and G. K. Parks. May 67, 26p NASA-CR-87824
Grants NSG-243, NSG-387

Descriptors: *Auroral activity, *Electron precipitation, *Geomagnetic micropulsation, *Magnetospheric instability, Activity, Aurora, Effect, Electron, Geomagnetic, Instability, Magnetosphere, Measurement, Micropulsation, Precipitation, Satellite, Storm.

For abstract, see STAR 05 20.
N67-34667 HC$3.00 MF$0.65

IONOSPHERE DATA, VERTICAL-ECHO-SOUNDING - FREIBURG, U R S I-CODE 131.
Ionosphaeren-daten Vertikal-echo-lotung - Freiburg Ursi-code 131
Ionospharen-institut Breisach (West Germany).
Mar 67, 44p REPT.-251-F
in German and English

Descriptors: *Echo, *Ionosphere, *Sounding, *Table, Data acquisition, West germany.

For abstract, see STAR 05 20.
N67-34732 HC$3.00 MF$0.65

IONOSPHERE DATA, VERTICAL ECHO SOUNDING - FREIBURG, U R S I-CODE 131.
Ionosphaeren-daten, Vertikal-echo-lotung - Freiburg, Ursi-code 131
Ionospharen-institut Breisach (West Germany).
Apr 67, 44p REPT.-250-F
in German and English

Descriptors: *Echo, *Ionospheric sounding, *West germany, Code, E layer, F layer, Frequency, Ionospheric, Punched card, Sounding, Table, Vertical, Wave.

For abstract, see STAR 05 20.
N67-34959 HC$3.00 MF$0.65

DETERMINATION OF ATMOSPHERIC COMPOSITION BY SOLAR ABSORPTION PHOTOMETRY.
Adelaide Univ. (Australia). Dept. of Physics.
J. H. Carver, P. J. Edwards, P. L. Gough, A. G. Gregsorber,

Descriptors: *Atmospheric composition, *Photometry, *Rocket measurement, *Solar absorber, Absorber, Atmospheric, Composition, Density, Detector, Flux, Measurement, Molecular, Number, Oxygen, Rocket, Solar, Spectroscopy, Ultraviolet, Woomera, X-ray.

For abstract, see STAR 05 20.
N67-35073 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN HIGH ALTITUDE METEOROLOGICAL SOUNDINGS IN THE U. S. A.
Weather Bureau, Silver Spring, Md. Data Acquisition Div.
For primary bibliographic entry see Field 4B.
PB-175 679 HC$3.00 MF$0.65

PROCEEDINGS OF THE ATMOSPHERIC RESEARCH AIRCRAFT INSTRUMENTATION WORKSHOP ANS SYMPOSIUM, NOVEMBER 17-18, 1966, OKLAMOMA CITY, OKLAMOMA.
National Center for Atmospheric Research, Boulder, Colo.
Jul 67, 190p NCAR-TN-29

Descriptors: (*Atmosphere, Symposia), (*Aircraft, Instrumentation), Meteorology, Airborne, Clouds, Air mass analysis, Mechanics, Reports, Measurement.

The National Center for Atmospheric Research and the Environmental Science Services Administration, with the endorsement of the American Meteorological Society, arranged an Atmospheric Research Aircraft Instrumentation Workshop and Symposium, held in Oklahoma City, 17 and 18 November 1966. The volume reports the proceedings of the Symposium, and includes the papers presented as well as much of the ensuing discussion. The Symposium consisted of three sessions, at each of which a different panel dealt with a specific aspect of airborne meteorological research. The three session topics were: Measurement of Air Motions, Cloud Physics and Kinematics, and Data Handling. It is hoped that the Symposium has proved useful in exploring, in open forum, some of the many problems associated with the use of airborne instrumentation in the atmospheric sciences. (Author)
PB-175 777 HC$3.00 MF$0.65

DETAILED SOUNDING ANALYSIS AND COMPUTER FORECASTS OF THE LIFTED INDEX.
Technical memo.,
National Meteorological Center, Suitland, Md.
John D. Stackpole. Aug 67, 18p WBTM-NMC-41

Descriptors: (*Atmospheric sounding, Analysis), (*Weather forecasting, Atmosphere models), Convection (Atmospheric), Algorithms, Troposphere, Dew point, Atmospheric temperature, Humidity, Diurnal variations, Meteorological charts, Computers.
Identifiers: Primitive equations.

With the recent availability of numerical means of calculating pseudo-adiabatic lapse rates, it has become possible to perform rather detailed sounding analyses in a routine operational manner. A number of stability and energetic parameters derived from sounding analysis, which are computed at NMC, are described. Also, with the inclusion of various moisture parameters into the six-layer

primitive equation (PE) forecast model, it is possible to make forecasts of a somewhat simpler stability parameter, the lifted index. The method of calculation of this quantity and some sample forecasts are presented. (Author)
PB-175 928 HC$3.00 MF$0.65

A NOTE ON THE DETERMINATION OF AVAILABLE POTENTIAL ENERGY BY VARIATIONAL METHODS.
Final rept.,
Florida State Univ., Tallahassee. Dept. of Meteorology.
Richard L. Pfeffer, and Yu Jen Chiang. 26 Jul 66, 29p Rept. no. 67-7
Grant Cwb-WBG-64
Rept. on proj. 'Available Potential Energy and Vacillation.'

Descriptors: (*Atmosphere models, *Atmospheric motion), Momentum, Rotation, Fluid dynamic properties, Gravity, Atmospheric temperature, Wind, Stability, Potential energy, Viscosity.

This report consists of two parts. The first is a paper which discusses two approaches to the problem of including rotation in the definition of available potential energy -- one approach yields the energy available to drive mean meridional circulations; the other yields the energy available to drive quasi-geostrophic motions in the atmosphere. The second paper distinguishes between two types of 'vacillation' in a rotating, differentially heated annulus of fluid -- tilted trough vacillation, which has been discussed in a number of previous papers in the literature, and amplitude vacillation which was first discovered by the authors in a series of student demonstrations conducted at the Lamont Geological Observatory in 1962. (Author)
PB-175 994 HC$3.00 MF$0.65

EXAMINING THE NATURE OF CONVECTIVE AND OROGRAPHIC CLOUD SYSTEMS USING SATELLITE CLOUD PHOTOGRAPHS.
Final rept., 1 Jun 65-31 May 67,
Oklahoma Univ. Research Inst., Norman.
Yoshikazu Sasaki. Jun 67, 158p
Grant CwB-WBG-57

Descriptors: (*Convection (Atmospheric), Cloud cover), (*Cloud cover, Meteorological satellites), Terrain, Fluid dynamic properties, Stability, Boundary value problems, Heat transfer, Atmosphere models.

Contents: List of research conducted under WBG-57; A generalized theory of Rayleigh Convection, Part I: Conductive and radiative boundary condition with kinematic free boundary condition in non-rotating field; Effects of large-scale subsidence on cellular convection in the atsmosphere: A numerical experiment.
PB-175 998 HC$3.00 MF$0.65

PARTICLE FALL AND DISPERSION IN THE ATMOSPHERE.
Semi-final rept. 9 Sep 66-31 Jan 67,
Travelers Research Center, Inc., Hartford, Conn.
K. D. Hage. Feb 67, 40p
Contract 48-4932

Descriptors: (*Atmospheric motion, *Particle trajectories), (*Particle size, Density), Scattering, Wind, Computer programs.

For abstract, see NSA 21 17.
SC-CR-67-2534 HC$3.00 MF$0.65

4B. Meteorology

ON THE BEHAVIOR OF DERIVATIVE PROCESSES,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Walter B. Miller, and Henry Rachele. Jun 67, 27p ECOM-5133

Descriptors: (*Wind, Measurement), Least squares method, Functions, Phototheodolites, Meteorological radar, Theodolites, Meteorological instruments, Meteorological parameters, Processing.

Radar, and high speed photo and optical theodolites are being used more frequently by the meteorologist for obtaining wind velocity data. These systems yield position data at a much faster rate than conventional optical theodolite systems. When deriving velocity data from the basic azimuth, elevation and range data, several factors should be taken into consideration. Of the many factors considered, the most significant presented in this paper are the expression for the expected value of the position components in an XYZ Cartesian coordinate system, a discussion of the simple difference method for computing velocity, a method to test the hypothesis that the position points can be expressed as a linear function of time, the effectiveness of using a least-squares technique if the position points are a linear function of time, and the expectations of velocity and velocity variance when the position points are a polynomial function of time with certain random deviations. (Author)
AD-657 561 HC$3.00 MF$0.65

ENVIRONMENTAL DATA BASE FOR REGIONAL STUDIES IN THE HUMID TROPICS.
Monthly microclimatic summary rept.,
Army Tropic Test Center Fort Clayton Canal Zone
Michael A. Fradel, and Wilfried H. Portig. Mar 67, 30p
See also AD-647 823.

Descriptors: (*Climatology, Tropical regions), Tropical tests, Soils, Instrumentation, Environmental tests, Atmospheric precipitation, Wind, Meteorological parameters, Environmental tests, Plants (Botany).

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT+E purposes. (Author)
AD-657 597 HC$3.00 MF$0.65

ENVIRONMENTAL CHARACTERISTICS OF TUNNELS IN SOUTH VIETNAM,
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 13M.
AD-657 599 HC$3.00 MF$0.65

WEATHER IN THE LUQUILLO MOUNTAINS OF PUERTO RICO.
Research paper,
Institute of Tropical Forestry Rio Piedras Puerto Rico
C. B. Briscoe. 1966, 259p Rept no. RP-ITF-3
USA-NLABS-TR-68-11-ES
Prepared in cooperation with Puerto Rico Univ., Rio Piedras.

Descriptors: (*Weather, Puerto Rico), Weather stations, Periodic variations, Rainfall, Mountains, Wind, Velocity, Humidity, Diurnal variations, Intensity, Dew point, Temperature, Meteorological parameters, Tables.

Puerto Rico is a mountainous, oceanic island in the American tropics, lying in the path of the northeast trade winds. Although the island is only 110 miles long by 35 wide, vegetation varies from rainforest in the eastern mountains to desert scrub in the southwest. From late 1958 through 1962 the U. S. Army and the Forest Service recorded information on temperature, humidity, wind, light, and rainfall at 13 locations in and near the Luquillo Mountains. Selected aspects of the information collected are summarized in the accompanying 17 tables. (Author)
AD-657 606 HC$3.00 MF$0.65

ICE MULTIPLICATION IN THE ATMOSPHERE,
Rand Corp Santa Monica Calif
L. Randall Koenig. Aug 67, 25p Rept no. P-3623
Prepared for presentation at Nucleation Conf. of Bureau of Reclamation, Denver, Colo. 10-12 Jul 67.

Descriptors: (*Ice, *Clouds), Particles, Measurement, Temperature, Freezing.

Data on the composition of unpolluted, unseeded stratocumulus and nimbostratus clouds having temperatures warmer than -9C reveal, in some instances, high concentrations of ice particles (to approximately 400 per liter of cloud). On the basis of measurements of the concentration of ice-forming nuclei reported in the literature, and the activation temperature of particles believed to be natural atmospheric ice nuclei, it is concluded that some multiplication process was responsible for the observed concentrations of ice particles. Since moderately large drops were present in the glaciating clouds, the data are consistent with a process whereby drops are frozen and splintered; however, in view of other evidence casting doubt on the validity of this process in the free atmosphere, alternative hypotheses are examined. Freezing of drops by a stochastic process is untenable, but a mechanical fracturing process seems possible and merits additional study. (Author)
AD-657 750 HC$3.00 MF$0.65

CLEAR LINES-OF-SIGHT FROM AIRCRAFT.
Air Force Surveys in geophysics no. 196,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Eugene A. Bertoni. Aug 67, 188p Rept no. AFCRL-67-0435

Descriptors: (*Meteorology, *Climatology), Clouds, Reconnaissance planes, Cloud cover, Aerial photography, Infrared detectors, Aircraft, Detection, Maps, Northern Hemisphere.

An in-flight observation program to collect observations of the presence, or absence, of clear lines-of-sight at several angles in the vertical plane has been completed. Approximately 72,000 observations were collected over a period of about 15 months. Observations were taken by flight crews of the Air Force, Navy, and Pan American Airways. Data were obtained over most of the Northern Hemisphere, except the area from 30E to 110E. All observations taken within a 10 deg latitude-longitude sector were grouped together by altitude and season. The relative frequency of a clear line-of-sight is plotted in the appropriate area on maps for various lines-of-sight. The number of observations on which the relative frequency is based is shown in parentheses. The relative frequencies are intended to serve as estimates of the probabilities of clear lines-of-sight. These estimates should be considered as a first approximation since, (a) the observations were taken in a very subjective manner, (b) the estimates are based only on about one season of data, and (c)

cloud variability may be quite large within some 10 degree sectors. (Author)
AD-657 801 HC$3.00 MF$0.65

SOME OBSERVATIONS PERTINENT TO THE THEORY OF RADAR SCATTERING BY CLOUDS,
Northeastern Univ Boston Mass Dept of Electrical Engineering
For primary bibliographic entry see Field 17I.
AD-657 808 HC$3.00 MF$0.65

REPORT ON HIGH ALTITUDE ROBIN FLIGHTS, OCTOBER 1966,
Dayton Univ Ohio Research Inst
Nicholas A. Engler. May 67, 25p Rept no. Scientific-1, UDRI-TR-67-132
AFCRL-67-0433
Contract AF 19 (628)-4796

Descriptors: (*Meteorological balloons, *Wind), Density, Pressure, Temperature, High altitude, Sensors, Numerical analysis, Velocity, Meteorological parameters, Tables.

Tracking data from high altitude ROBIN balloon flights are reduced to yield meteorological parameters. Plots of these parameters are shown and comparison is made to a model. Different smoothing techniques are examined using objective methods. Differences in the meteorological parameters as a function of the smoothing interval are examined. (Author)
AD-657 810 HC$3.00 MF$0.65

THE EFFECT OF HAZE UPON UMKEHR MEASUREMENTS,
Florida State Univ Tallahassee Dept of Meteorology
John J. DeLuisi. 1 Jul 67, 175p Rept no. Scientific-3, 67-3
AFCRL-67-0367
Contract AF 19 (628)-4953, Grant NSF-GP-2393

Descriptors: (*Meteorological balloons, Ozone), (*Ozone, *Spectrophotometers), Intensity, Temperature, Measurement, Surface properties, Aerosols, Theory, Reflection, Particles, Scattering, Tables, Haze.
Identifiers: UMKEHR method.

The use of Mie-scattering functions in a primary-scattering model show that haze affects an Umkehr curve by slightly increasing the N-values for zenith angles of about 60-75 degrees, and slightly decreasing the N-values for zenith angles of about 75-90 degrees. A cross-over point is implied. Another implication derived for the model calculations is that the type and amount of variation of the Umkehr curve depends mostly on the total optical depth of haze particles and not so much on the size distribution and refractive index of the haze particles, within reasonable limits of variation. The existence of simultaneous balloon-Umkehr data, obtained at Florida State University, permits an experimental analysis of the influence of haze upon Umkehr curves. Both model and experimental results show that for a C-wavelength-pair Umkehr curve that has been normalized to zero at a zenith angle of 60 degrees, the presence of haze decreases the N-values (on the average) by a maximum value of 2 at a zenith angle of 80 degrees. From the experimental haze residual, a total average optical depth of haze particles of .30-.33 is inferred for a standard clear atmosphere over Tallahassee. Umkehr curves that have been adjusted for an average haze effect produce ozone distributions that agree better with the simultaneously measured balloon ozone distributions. (Author)
AD-658 007 HC$3.00 MF$0.65

INTERACTION BETWEEN AN INSTRUMENT CAVITY AND A FLOW OF RAREFIED GAS.
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 20D.
AD-658 028 HC$3.00 MF$0.65

ONSET-DURATION TABLES OF SPECIFIED CEILING AND VISIBILITY CATEGORIES.
Technical paper,
Weather Wing (4th) Ent AFB Colo Scientific Services Branch
Joe S. Restivo. Aug 67, 22p
4WW-TP-67-1

Descriptors: (*Meteorology, Tables), (*Ceiling, Tables), Visibility, Weather, Climatology, Periodic variations, Meteorological parameters, Wind.

The paper describes a new type of table which shows for each initial ceiling (and visibility) category, frequency distributions of onset times, a duration history based on successive hours of occurrence and a complete history of the type and frequency of subsequent one-hour weather category changes. (Author)
AD-658 038 Not available from CFSTI.

GREAT LAKES ICE COVER WINTER 1965-66.
United States Lake Survey Detroit Mich
For primary bibliographic entry see Field 8L.
AD-658 227 HC$3.00 MF$0.65

TOTAL ATMOSPHERIC WATER VAPOR ALOFT OVER THE GREAT LAKES BASIN.
Research rept.,
United States Lake Survey Detroit Mich
S. J. Bolsenga. Apr 67, 16p Rept no. RR-5-3

Descriptors: (*Atmospheric condensation, Great Lakes), (*Water vapor, Great Lakes), Equations, Radiosondes, Dew point, Atmosphere, Tables, Maps.

Monthly isoline charts (January-December) are used to indicate the total atmospheric water vapor distribution over the Great Lakes. Empirical equations were derived relating surface dew point to water vapor aloft using observations at three radiosonde stations in the basin. The isoline charts were constructed from data obtained at the three radiosonde stations supplemented by additional values estimated from the equations at 29 stations reporting only surface dew point. (Author)
AD-658 228 HC$3.00 MF$0.65

REPORT OF BISTATIC RADAR EXPERIMENT DESIGNED TO MEASURE THE IN-CLOUD DROP SIZE DISTRIBUTION FUNCTION.
Final rept.,
Texas Univ Austin Antennas and Propagation Div
Alfred H. LaGrone. 24 Jul 67, 35p Rept no. P-18
Contract DA-49-092-ARO-87

Descriptors: (*Raindrops, Particle size), (*Distribution functions, Raindrops), Measuring devices (Electrical + electronic), Meteorological radar, Clouds, Scattering, Meteorological instruments.

Facilities for determining the orthogonal components of the angle scattered signal and the backscattered signal of reflections from hydrometers for a vertically looking radar operating an X-band were developed. Meteorological instruments such as tipping bucket rain gages, anemometer, thermometer, and drop size distribution counter were employed for surface control. Measurements were made on a number of rain showers and were analyzed. Excellent agreement was found between the amplitude of the bistatic radar signals, both E subscript theta and E subscript phi, and the rain rate determined by the tipping bucket rain gages. The drop size distribution meter indicated distribution functions that were in close agreement with a two parameter distribution proposed by Marshall-Palmer. (Author)
AD-658 230 HC$3.00 MF$0.65

PROJECT TOPCAT - POWER SPECTRAL MEASUREMENTS OF CLEAR AIR TURBULENCE ASSOCIATED WITH JET STREAMS.
Royal Aircraft Establishment, Farnborough (England).
A. Burns, and C. K. Rider. Sep 65, 39p RAE-TR-65210

Descriptors: *Clear air turbulence, *Jet stream, *Power spectrum, *Topcat project, Air, Canberra aircraft, Clear, Component, Flight, Jet, Lateral, Longitudinal, Measurement, Plot, Power, Spectrum, Stream, Turbulence, Vertical.

For abstract, see STAR 05 20.
N67-35139 HC$3.00 MF$0.65

AN ATLAS OF SPECTRA FROM 1.6 TO 5.4 MICRONS, AIRCRAFT MEASUREMENTS OVER NATURAL SURFACES AND ATMOSPHERES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. A. Hovis, and M. Tobin. Aug. 1965, 340p NASA-TM-X-55882, X-622-67-358

Descriptors: *Earth surface, *Energy spectrum, *Spectral reflectance, *Wave chart, Aircraft, Chart, Curve, Data, Digital, Earth, Energy, Jet, Measurement, Reflection, Solar, Spectral, Surface, Wave.

For abstract, see STAR 05 20.
N67-35252 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN HIGH ALTITUDE METEOROLOGICAL SOUNDINGS IN THE U. S. A.
Technical memo.,
Weather Bureau, Silver Spring, Md. Data Acquisition Div.
Vaughn D. Rockney. Jun 67, 42p WBTM-DATAC-1

Descriptors: (*Atmospheric sounding, Radiosondes), (*Radiosondes, Upper Atmosphere), Stratosphere, Troposphere, Sounding rockets, Wind, Meteorological balloons, Weather stations, Sensors, Atmospheric temperature.

The report describes efforts of the U. S. A. to obtain rawinsonde data routinely to altitudes of 31 km. (i.e., = or < 10 mb.) and data by rockets to 65 km. (i.e., = or < 0.1 mb). Equipment in use and networks of stations are outlined and operational problems are discussed.
PB-175 679 HC$3.00 MF$0.65

OPERATIONAL LESSONS OF THE LINE ISLANDS EXPERIMENT. LINE ISLANDS CRITIQUE 5 MAY 1967, PINEAPPLE RESEARCH INSTITUTE UNIVERSITY OF HAWAII.
Technical notes.
National Center for Atmospheric Research, Boulder, Colo.
Aug 67, 82p NCAR-TN-30

Descriptors: (*Meteorological parameters, Pacific Ocean Islands), Instrumentation, Photography, Motion pictures, Weather, Reports, Scientific research, Hawaii.

During March and April 1967, field parties from NCAR and other meteorological research organizations, universities, and governmental agencies established research bases in the Line Islands, a group of small atolls more than 100 miles south of Hawaii. From these three islands and from aircraft and ships in the vicinity, observation groups collected one of the most comprehensive sets of meteorological data ever obtained in the tropics. These data are tied in with photographs taken by NASA's ATS-1 satellite, in synchronous orbit almost directly above the Line Islands; they include

observations of standard meteorological parameters, made with conventional instrumentation, and a great abundance of still and motion photographs. (Author)
PB-175 708 HC$3.00 MF$0.65

SHORT RANGE, SUBSYNOPTIC SURFACE WEATHER PREDICTION.
Technical memo.,
Weather Bureau, Silver Spring, Md. Techniques Development Lab.
H. R. Glahn, and D. A. Lowry. Jul 67, 14p WBTM-TDL-11

Descriptors: (*Weather forecasting, *Diurnal variations), Clouds, Atmospheric precipitation, Pressure, Statistical data, Accuracy.

An on-going program within the Techniques Development Laboratory of the Weather Bureau to develop an operating system for making objective forecasts of weather variables on a space scale of approximately 50 miles and a time scale of 1 hour up to about 18 hours is described. The system will consist of a combination of numerical (dynamic) and statistical models. Precipitation and cloudiness forecasts for the 'Today' period, 7:00 A.M. to 7:00 P.M., over the eastern United States are receiving primary emphasis. Intermediate products are hourly sea level pressure forecasts valid between 7:00 A.M. and 7:00 P.M. It appears the sea-level pressure and precipitation forecasts are superior to the machine produced guidance forecasts presently available within NMC. (Author)
PB-175 772 HC$3.00 MF$0.65

NOTES ON WIND MEASUREMENT.
Technical memo.,
Weather Bureau, Silver Spring, Md. Equipment Development Lab.
Herman H. Crouser. Aug 67, 26p WBTM-EDL-2

Descriptors: (*Wind, Measurement), Wind tunnels, Anemometers, Velocity, Corrosion-resistant alloys, Response, Calibration, Steel.

These notes cover a test report on type F420-C high-speed anemometer cup-rotors, fabricated from corrosion-resistant steel, and with the test results showing the greatest difference between tunnel and indicated speeds to be 1.35 knots; a description of the idealized response characteristics of the standard F420-C cup-rotor to both step and sinusoidal inputs, and the idealized response characteristics of the F420-C direction vane to step input; and the problem of linear calibration of the cup-rotor, arising from approximating a power function by a straight line function, that causes errors in the measurement of miles of passage of wind. Sections 3 and 4 include a compilation of information on F420-C wind equipment that has not previously been readily available. (Author)
PB-175 774 HC$3.00 MF$0.65

ARIZONA WEATHER MODIFICATION PROGRAM. RESEARCH REPORTS FOR FY 1965, 1966, AND 1967,
Meteorology Research Inc., Altadena, Calif.
Paul B. MacCready, Jr. 30 Apr 67, 168p MR166-FR-457
Contract DI-14-06-D-5589
Report on project Skywater.

Descriptors: (*Climatology, Arizona), (*Clouds, Dynamics), Silver compounds, Iodides, Generators, Airborne, Ice, Aircraft, Fluorescence, Atmospheric precipitation, Buoyancy, Temperature.

Contents: Cloud dynamics (cloud buoyancy increase due to seeding, cloud dynamics and precipitation model, traveling mesoscale systems); Natural and artificial nuclei (environmental background of ice nuclei, generation of artificial ice nuclei, continuous ice nuclei counter, tracing of plumes of fluorescent particles and AgI, giant condensation nuclei); Case studies of seeding (case study of seeding of vertical-fall pyrotechnic AgI generators, case study of ground and airborne cloud seeding with silver iodide, case studies - metaldehyde seeding); The winter program (cloud dynamics, natural and artificial nuclei, case studies of seeding). (Author)
PB-175 775 HC$3.00 MF$0.65

ARIZONA WEATHER MODIFICATION RESEARCH PROGRAM. FINAL REPORT FOR FY 1965, 1966, AND 1967,
Meteorology Research Inc., Altadena, Calif.
Paul B. MacCready, Jr. 30 Apr 67, 129p MR166-FR-407r
Contract DI-14-06-D-5589
Report on project Skywater.

Descriptors: (*Climatology, Arizona), (*Clouds, *Atmospheric precipitation), Silver compounds, Iodides, Generators, Airborne, Ice, Aircraft, Colloids, Thermodynamics, Effectiveness, Storms, Instrumentation, Computers.

The report describes the status of the Arizona Weather Modification Research Program two years after its inception. The program included a small investigation of seeded and non-seeded summer storms in 1965, a brief winter field project early in 1966, a major program in the summer of 1966, and the associated planning, technique developments, and evaluation. The conduct and results of the three field projects are presented in this volume of the final report. Twelve additional separately authored special reports are enclosed in a companion volume titled 'Arizona Weather Modification Research Program - Research Reports for FY 1965, 1966, and 1967'; these represent topics in cloud dynamics, nuclei, and case studies which were covered in sufficient detail to warrant a separate report. The main effort of the summer 1966 season was devoted to field experiments for comparison with computer models of the microphysics and dynamics effects of seeding, exploratory work on the organization of mesoscale flows by seeding, precipitation results from massive seeding, and the development of advanced field techniques for large scale research and operational engineering studies of seeding. Case studies of some of the seeding events are described with some definite results, some tentative results, and some speculations based on the observations. (Author)
PB-175 776 HC$3.00 MF$0.65

WEATHER PHENOMENA IN HAWAII. PART I. SYNOPTIC CLIMATOLOGY OF HAWAII. PART II. A PRELIMINARY STUDY OF THUNDERSTORMS IN HAWAII.
Final rept.,
Hawaii Inst. of Geophysics, Honolulu.
L. E. Worthley, and C. B. H. Lee. Jun 67, 63p HIG-67-9-Pt-1/2
Contract Cwb-11373

Descriptors: (*Hawaii, Climatology), (*Thunderstorms, Hawaii), Air mass analysis, Cyclones, Anticyclones, Dew point, Meteorological charts, Diurnal variations, Radiosondes.

Twenty years of manuscript maps of the Honolulu Airport Station, ESSA Weather Bureau, plus ten years of the Historical Map Series are studied to update the synoptic climatology of the Hawaiian Islands. Mean number, maximum and minimum number, and actual number of frontal passages are given for the four major islands by month and by winter season. Frequency of the date of first and last frontal passage of winter, and of the number of frontal passages per month is also given. In addition the number of cyclonic storms (excepting tropical cyclones) occurring within 500 miles of the islands is tabulated. (Author)
PB-175 801 HC$3.00 MF$0.65

FURTHER EXPERIMENTATION: STATISTICAL PREDICTION OF PRECIPITATION PROBABILITY.
Final rept.,
Travelers Research Center, Inc., Hartford, Conn.
John A. Russo, Jr. Aug 67, 41p Rept. no. 7624-268
Contract Cwb-11355

Descriptors: (*Weather forecasting, Atmospheric precipitation), (*Atmospheric precipitation, Statistical analysis), Predictions, Sampling, Climatology, Moisture, Meteorological parameters.

A number of experiments are performed in an attempt to: (1) improve the Regression Estimation of Event Probability (REEP) precipitation forecast equations developed in a previous study, (2) gain insight into potential improvement areas, and (3) assess the feasibility of extending the work to the prediction of quantitative precipitation amounts. Through the experimental work it is determined that the most promising area for improvement of the REEP prediction equations, for the shorter period forecasts, is through inclusion of a variable denoting existing conditions (persistence). A number of different forms of persistence are recommended for inclusion in future work (see Section 4.2). Other attempts at improvement of the prediction equations were not fruitful. Experimental work aimed at determination of the feasibility of extending this work to the prediction of quantitative precipitation amounts was promising upon generation of an all-precipitation sub-sample.
PB-175 802 HC$3.00 MF$0.65

SNOW PREDICTION IN THE EASTERN UNITED STATES.
Final rept.,
New York Univ., N. Y. Geophysical Sciences Lab.
Jerome Spar, Joseph R. Bocchieri, Robert A. Godfrey, Silvio G. Simplicio, and James P. Travers. Jun 67, 81p TR-67-4
Contract E-12-67 (N)

Descriptors: (*Snow, *Weather forecasting), Atmospheric precipitation, Periodic variations, Rainfall, Storms, Predictions, Volume, Urban areas, New York.

The New York City snow prediction problem was divided into three parts: prediction of starting time, discrimination between rain and snow, and estimation of snowfall amount. Only limited success has been achieved in forecasting snow starting time by kinematic extrapolation of precipitation isochrones. A practical operational method of determining the probability of snow-versus-rain was developed for New York City. A method of estimating the probabilities of light, moderate, or heavy snow at New York City associated with coastal cyclones was developed based on the sea level cyclone track, central pressure, and storm duration. Diagnostic studies of two east coastal cyclones of the winter of 1966-1967 were begun using data from a sub-synoptic network, aircraft observations, and three-hourly rawinsondes. Prognostic and diagnostic computations are being carried out at NMC with the data obtained. (Author)
PB-175 803 HC$3.00 MF$0.65

SNOW FORECASTING PROCEDURES IN THE CENTRAL UNITED STATES.
Final rept.,
Atmospheric Research and Development Corp., Kansas City, Mo.
Howard H. Hanks, Jr., Dean R. De Harpporte, and Eugene C. Grueber. Jun 67, 39p
Contract Cwb-11353

Descriptors: (*Snow, *Weather forecasting), Storms, Periodic variations, Rainfall, Volume, Dew point, Accuracy, Predictions, United States.

The synoptic approach is employed in developing methods of predicting snowfall, with emphasis on snow storms producing 4 inches or more of snow. Data were obtained for winter storms in the central United States for a nine year period ending in 1967. Routinely measured synoptic parameters available on operational NMC charts were related to criteria for snowfall, the placement and width of the 2 and 4 inch total snowfall, a single point forecast of 2 inches or more of snow, and 6 and 12-hourly distributions of snow. The total snowfall for a given area was determined by use of the maximum vorticities at sea-level and 500 mb. It was concluded that the most effective single parameter separating rain from snow for elevations near and below 1000 feet M. S. L. is the 2840-m. 1000-700-mb. thickness line. The most accurate parameters for predicting the maximum total snowfall are sea-level relative geostrophic vorticity, 500-mb. relative vorticity, and 850-mb. dew point. Successful correlation of the width of the snow band to various synoptic parameters permits fairly accurate placement of the axis of heaviest snow and the northern edge of the snow band. Placement and prediction of the amount of snowfall by means of 6 and 12-hourly snowfall statistics were only partially successful. (Author)
PB-175 804 HC$3.00 MF$0.65

STATISTICAL THEORY OF EXTREME VALUES AND SOME PRACTICAL APPLICATIONS. A SERIES OF LECTURES.
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
For primary bibliographic entry see Field 12A.
PB-175 818 HC$3.00 MF$0.65

DETAILED SOUNDING ANALYSIS AND COMPUTER FORECASTS OF THE LIFTED INDEX.
National Meteorological Center, Suitland, Md.
For primary bibliographic entry see Field 4A.
PB-175 928 HC$3.00 MF$0.65

NOTE ON PROBING BALLOON MOTION BY DOPPLER RADAR.
Technical memo.,
National Severe Storms Lab., Norman Okla.
Roger M. Lhermitte. Jul 67, 21p IERTM-NSSL-34

Descriptors: (*Meteorological balloons, Motion), (*Doppler radar, Meteorological balloons), Velocity, Oscillation, Periodic variations, Synthetic rubber, Wind, Measurement, Reynolds number.

The motion of free balloons has been analyzed with Doppler radar techniques. Balloons in the subcritical Reynolds regime exhibit periodic variations of radial velocity. These variations are explained in terms of an helicoidal balloon motion with orbit radius approximately equal to the balloon diameter and vertical wavelength 10 to 15 times larger. Large irregular oscillations of balloon motion characterize flights with Reynolds number larger than 20,000. (Author)
PB-175 930 HC$3.00 MF$0.65

THE UPPER-TROPOSPHERIC AND LOWER-STRATOSPHERIC STRUCTURE OF SEVERAL HURRICANES.
Technical memo.,
National Hurricane Research Lab., Miami, Fla.
Pancheti Koteswaram. Jul 67, 76p IERTM-NHRL-79

Descriptors: (*Tropical cyclones, *Troposphere), (*Stratosphere, Tropical cyclones), Wind, Thermal properties, Pressure, Temperature, Radiosondes.

A synoptic study of several hurricanes at the time of landfall is described with particular reference to the thermal and wind structure in the upper troposphere and lower stratosphere. The low pressure core of a mature hurricane, before recurvature, seems to extend not only throughout the troposphere but sometimes may protrude into the lower stratosphere up to about 27 km., the the upper limit of this investigation. The upper core is found to be cold above 15 km. with temperatures occasionally 8-10C. below normal at the tropopause level. Features such as a peripheral ridge and a peripheral jet in the upper troposphere are described and the possible role of these features, as well as of the cold core, in the hurricane mechanism is discussed. The cold core may be caused by forced ascent above the wellknown, warm core of a hurricane. The study has also revealed that a hurricane which has recurved into the extratropical westerlies does not have an upper cold core, and its structure closely corresponds to the classical model. Tentative schematic models of the distribution of temperature and height anomalies are indicated in the case of a mature hurricane before recurvature. (Author)
PB-175 931 HC$3.00 MF$0.65

ENERGY SPECTRA FOR CLOUDY AIR,
Chicago Univ. , Ill. Cloud Physics Lab.
Bernice Ackerman. 15 Aug 67, 6p
Grant NSF-GP-3881
Presented at the Annual Meeting, American Geophysical Union (48th), 20 Apr 1967, Washington, D. C.

Descriptors: (*Tropical cyclones, Meteorological parameters), (*Clouds, Turbulence), Convection (Atmospheric), Kinetic energy, Atmosphere models, Statistical analysis.

A spectrum analysis was made of measurements of several meteorological parameters obtained in hurricane cloud areas. The shapes of the spectra were characteristically that of red noise and an obvious extension of the earlier research was the examination of the functional relationship between the spectrum density and frequency. This report presents results for the turbulence spectrum for the frequency range extending from 7 to 8 cy/mi (200-250 meter wavelength) to about 20 to 25 cy/mi (70 or 80 meter wavelength).
PB-175 990 HC$3.00 MF$0.65

CIRRUS CLOUD SEEDING AS A TRIGGER FOR STORM DEVELOPMENT,
Chicago Univ., Ill. Cloud Physics Lab.
Roscoe R. Braham, Jr. 15 Aug 67, 12p
Grant NSF-GP-3779
Presented at the Annual Meeting, American Geophysical Union (48th), 17 Apr 1967, Washington, D. C.

Descriptors: (*Cirrus clouds, Artificial precipitation), (*Storms, Artificial precipitation), Convection (Atmospheric), Troposphere, Stability, Dew point, Thunderstorms, Atmospheric temperature, Ice, Crystals.

The importance of ice crystals from higher clouds appears to be their ability to trigger the organization of middle level instability. Instability that would otherwise lead to a large area but weak intensity field of disordered and small convective clouds can be funneled into a few major centers which are self propagating and which yield considerable rain to the ground. Documentation of this fact is of considerable importance to cloud seeding and weather modification, because it shows the possibility of artificially seeding unstable middle clouds to accomplish the same ends. On the other hand this study clearly shows that the natural cirrus are capable of adequately performing this role in many meteorological situations. It remains to be seen how often unstable middle clouds may occur without the presence of adequate amounts of higher cirrus. (Author)
PB-175 993 HC$3.00 MF$0.65

EXAMINING THE NATURE OF CONVECTIVE AND OROGRAPHIC CLOUD SYSTEMS USING SATELLITE CLOUD PHOTOGRAPHS.
Oklahoma Univ. Research Inst., Norman.
For primary bibliographic entry see Field 4A.
PB-175 998 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

MAINTAINABILITY ENGINEERING GUIDE.
Revised ed.,
Army Missile Command, Redstone Arsenal, Ala. Quality and Reliability Management Office.
Charles D. Cox. 1 Apr 67, 129p RC-S-65-2
Revision of manuscript submitted 1 Oct 65.

Descriptors: (*Maintainability, Design), (*Management planning, Maintainability), (*Weapon systems, Maintainability), Test methods, Mathematical prediction, Maintenance, Specifications, Theory, Scheduling, Statistical tests.

This engineering guide introduces the design engineer, the development engineer, and the development manager to the fundamental concepts of specifying, quantifying, and testing for a specific level of maintainability, with particular application to Army missile weapons and equipment. Covered in the guide are the fundamental mathematical concepts associated with maintainability, design guidelines to enhance maintainability, the major program requirements, and demonstration techniques. More specifically, a practical method is formulated and presented for applying the fundamental engineering and statistical techniques associated with the technology of maintainability.
AD-471 857 HC$3.00 MF$0.65

DISCOUNTED PRODUCTION SCHEDULING AND EMPLOYMENT SMOOTHING.
Stanford Univ Calif Graduate School of Business
For primary bibliographic entry see Field 12B.
AD-657 624 HC$3.00 MF$0.65

USE OF TAERS DATA IN ARMY MAINTENANCE MANAGEMENT,
Army Materiel Command Washington D C
John P. Traylor. 1965, 27p
Prepared for presentation to the Institute of Management Sciences.

Descriptors: (*Maintenance, *Management engineering), Army equipment, Logistics.

The address discusses the Army Equipment Record System, an information system currently used by the Army in its business of managing a global maintenance system.
AD-657 637 HC$3.00 MF$0.65

EUROPE'S ENIGMATIC GAP,
Rand Corp Santa Monica Calif
A. Kramish. Aug 67, 16p Rept no. P-3651
Prepared for presentation at Services Course of Royal Inst. of Int. Affairs, Spring 1967.

Descriptors: (*Industrial research, *Management planning), (*Leadership, *Industrial production), Economics, Costs, Scientific research, Attitudes, Nuclear industrial applications, Patents, Manufacturing methods, Environment, Political science, Efficiency.

The rate of a nation's technological growth is proportional to the external pressures, and to a vague factor incorporating national awareness and will.

This derivative of technological progress is the real measure of a nation's technological strength; it is clearly indebted to the huge amount of technology which is being generated everywhere else in the world. Under this interpretation, the imbalance becomes a spur to technological progress.
AD-657 752 HC$3.00 MF$0.65

COST REPORTING FOR DEVELOPMENT OF INFORMATION PROCESSING SYSTEMS,
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-657 793 HC$3.00 MF$0.65

UNIFORM AUTOMATED DATA PROCESSING SYSTEM FOR SUPPLY MANAGEMENT,
Naval Supply Systems Command Washington D C
R. A. Jones. Oct 66, 6p
Availability: Published in Newsletter p22-6 Oct 1966.

Descriptors: (*Data processing systems, Inventory), Management engineering, Inventory control, Armed forces supplies.

The article discusses a uniform automated data processing system for supply management. Subjects covered include the background of this system, its objectives, the basic concepts and organization which are at the heart of the system, the programs and principal features, and the problems we currently face.
AD-657 881 Not available from CFSTI.

A PERSONNEL COST DATA BANK FOR USE IN STUDIES OF COST AND EFFECTIVENESS.
Research memo.,
Naval Personnel Research Activity San Diego Calif
Marilee N. Connelly. Aug 67, 54p Rept no. NPRA-SRM-68-3

Descriptors: (*Cost effectiveness, Predictions), (*Naval personnel, *Costs), Systems engineering, Computers, Feasibility studies, Decision making, Man-machine systems, Training, Naval research, Personnel management.

The purpose of this study is to develop the structure of a data bank system which will facilitate the acquisition and computation of personnel costs needed for cost/effectiveness predictions. The Navy's need for adequate personnel cost information, especially during the development of new systems, was investigated. Data bank systems and cost models were examined. None, however, could provide predictive, system oriented personnel costs upon which to base function allocation decisions. The concept of using a computerized system for cost acquisition and computation was evaluated and found feasible. Consequently, the structure, contents, and formulae to be used in such a data bank system were derived and are formally proposed within this report. The tasks required to develop the system are delineated. On the basis of this research, it is recommended that the personnel cost data bank system proposed herein be fully developed as soon as possible. Solutions to the problems of establishing, maintaining, and using the system for system development cycle support should be sought during the time the cost data system is being developed. The system should be implemented, maintained, and used as soon as possible.
AD-657 941 HC$3.00 MF$0.65

MANUAL OF DATA PROCESSING STANDARDS.
Defense Intelligence Agency Washington D C
For primary bibliographic entry see Field 9B.
AD-658 158 HC$3.00 MF$0.65

FIFTY YEARS AFTER OCTOBER: PARTY AND SOCIETY IN THE USSR,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5D.
AD-658 251 Not available from CFSTI.

THE ROLE OF FOLLOW-ON CONTRACTS IN GOVERNMENT-SPONSORED RESEARCH AND DEVELOPMENT.
Massachusetts Inst. of Tech., Cambridge. Alfred P. Sloan School of Management.
W. H. Dyer, III, and E. B. Roberts. Jul 67, 31p NASA-CR-87404, REPT.-269-67
Grant NSG-235

Descriptors: *Contract, *Industry, *Management planning, *Research project, Aerospace, Cost, Defense, Development, Effect, Government, Management, Market, Planning, Prediction, Procurement, Production, Program, Project, Research, Schedule, Technology, Time.

For abstract, see STAR 05 20.
N67-34156 HC$3.00 MF$0.65

OPTIMAL CONTINUOUS REVIEW POLICIES FOR TWO PRODUCT INVENTORY SYSTEMS WITH JOINT SETUP COSTS.
Columbia Univ., New York. Operations Research Group.
E. Ignal. 15 Dec 66, 27p NASA-CR-87490, TR-35
Contract NONR 266/55/

Descriptors: *Inventory control, *Management planning, *Operations research, *Replacement, Control, Cost, Engineering, Inventory, Management, Mathematics, Operation, Order, Planning, Programming, Research, Statistical, Value.

For abstract, see STAR 05 20.
N67-34460 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT PROCUREMENTS - MARKETING PRACTICES AND PROBLEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
L. Rawicz. Aug 66, 29p NASA-TM-X-60213
Presented At the 2d Gsfc- Ind. Seminar, Greenbelt, Md., 10 Aug. 1966

Descriptors: *Aerospace technology, *Conference, *Contract, *Industry, *Management planning, *Nasa program, Aerospace, Budget, Development, Factor, Management, Market, Planning, Procurement, Product, Program, Requirement, Research, Technology, Time.

For abstract, see STAR 05 20.
N67-34722 HC$3.00 MF$0.65

STUDY GROUP FOR SYSTEM DEVELOPMENT.
Studiengruppe Fuer Systemforschung Kernforschungszentrum, Karlsruhe (West Germany).
Mar 67, 52p REPT.-83
in German

Descriptors: *Information processing, *Management planning, *Research project, *Systems analysis, Analysis, Application, Chemistry, Data, Economics, Industry, Information, Management, Mathematics, Model, Planning, Processing, Project, Research, Science, Sociology, Statistics, System.

For abstract, see STAR 05 20.
N67-34918 HC$3.00 MF$0.65

ELECTRIC, ELECTRONIC HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
Nov 66, 510p NAVFAC-P-703.0
Supersedes PB-181 120-Rev.

Descriptors: (*Electrical equipment, Maintenance), (*Electronic equipment, Maintenance), (*Maintenance, *Job analysis), Standards, Handbooks, Maintenance personnel.
PB-175 713 HC$3.00 MF$0.65

MAINTENANCE RESEARCH. REPORT ONE. ORGANIZATION AND OPERATIONS.
Jorgensen (Roy) and Associates, Washington, D. C.
May 67, 144p Rept. no. 0835
Prepared in cooperation with Louisiana Dept. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Management engineering), (*Maintenance, Roads), Management planning, Budgets, Operation, Performance (Human), Tables.

The study is the first of seven reports on results of the Louisiana Maintenance Management Study. It summarizes the research and findings for work conducted between September 1965 and December 1966. The objectives and responsibilities of the maintenance function of the Department are analyzed and evaluated--including statutory and policy provisions. The character of the maintenance workload, determined from Department records, is described. An evaluation of performance of maintenance operations through an analysis of recorded data is made. The Department's budgeting and fiscal planning activities relative to maintenance operations are described, analyzed and evaluated, as is the existing reporting system. An analysis and evaluation of the manner in which the Department presently is organized to perform work. The processes and responsibilities for maintenance management are presented. An evaluation of the maintenance organizational structure along with recommendations for improved organization consistent with the needs of effective management and work performance is made. Recommendations for additional continuing maintenance research which should be undertaken is made. Some research and development is presently underway or has been approved for early initiation. A schedule is presented for these planned research activities. (Author)
PB-175 757 HC$3.00 MF$0.65

MANAGING HIGHWAY MAINTENANCE IN VIRGINIA. PART IV.
Jorgensen (Roy) and Associates, Gaithersburg, Md.
For primary bibliographic entry see Field 13B.
PB-175 811 HC$3.00 MF$0.65

5B. Documentation and Information Technology

FIRST ANNUAL REPORT OF THE AIR FORCE MACHINABILITY DATA CENTER.
Rept. for 1 Oct 64-31 Jan 66,
Metcut Research Associates, Inc., Cincinnati, Ohio.
John F. Kahles. Feb 66, 42p
AFMDC-65-2
Contract AF 33 (615)-2161

Descriptors: (*Machining, *Technical information centers), Data processing systems, Data storage systems, Costs, Management engineering.

Eight thousand seven hundred and sixteen (8,716) documents were processed and 45,326 information points were evaluated, 20,380 of which were placed in data storage. Five hundred ninety-five (595) specific inquiries were answered for 314 dif-

ferent companies in 71 different SIC categories. Three thousand two hundred twenty-three (3,223) copies of 'Machining Data for Titanium Alloys', AFMDC 65-1, were distributed, most of which were sent to the User File consisting of 2,304 individuals. Average cost of all document processing was $14.47 per document or $40.71 per completely evaluated document. Average cost of inquiries equalled $47.49 per inquiry. Plans for the next year of operation include addition of an 1130 IBM low cost computing system. (Author)
AD-482 278 HC$3.00 MF$0.65

FLOW OF SCIENTIFIC AND TECHNICAL INFORMATION: THE RESULTS OF A RECENT MAJOR INVESTIGATION.
Revised ed.,
Douglas Aircraft Co Inc Huntington Beach Calif Missile and Space Systems Div
A. F. Goodman. 1 Sep 67, 60p Rept no. DAC Paper-4516
Presented at the International Meeting of the Institute of Management Sciences (14th), Mexico City, Mexico, 22-26 August 1967.

Descriptors: (*Information retrieval, Effectiveness), (*Documentation, Dissemination), Scientific research, Engineering, Reports, Libraries, Periodicals.

The investigation characterized the scientific and technical information needs of 1,500 scientists and engineers from 73 companies, 8 research institutes, and 2 universities; and the flow of scientific and technical information (flow process) inherent in satisfying these needs. Interviewers asked 63 questions in the following four subject areas: (1) the USER of scientific and technical information, (2) the user's most recent scientific or technical TASK, (3) the user's general UTILIZATION of the information system, and (4) the user's SEARCH AND ACQUISITION process for information used in task performance. Goals for the flow process, future analysis of the flow process, characterization of the flow process, and analysis of flow-process data are summarized. In addition, the goals and future analysis recommendations reflect work performed by the author after completion of the study. (Author)
AD-657 558 HC$3.00 MF$0.65

AN EXPERIMENTAL CHEMICAL INFORMATION AND DATA SYSTEM.
Status rept. Jan-Dec 66,
Pennsylvania Univ Philadelphia
Clarence T. Van Meter, David Lefkovitz, and Ruth V. Powers. Jan 67, 220p Rept no. CIDS-4
Contract DA-18-035-AMC-288 (A)

Descriptors: (*Chemical compounds, *Information retrieval), (*Molecular structure, Information retrieval), Data processing systems, Subject indexing, Symbols, Search theory, Input-output devices.
Identifiers: CIDS project, Chemical notation systems.

The report describes a chemical information and data system in the form in which it was expected to be available for initial experimentation by Army installations on or about 1 May 1967. The description deals primarily with matters referable to structural chemistry. It discloses those structural features that the system presently utilizes to discriminate among chemical compounds, depicts the assignment of keys to these features, and illustrates the use of these keys in the processing of queries addressed to the system. It also discloses certain types of chemical compounds that require further study before they can be incorporated into the system. The kind of nonstructural information and data planned to be incorporated for early experimentation are identified. Matters germane to system configuration, programming, and program execution are scheduled for inclusion in a subsequent report. (Author)
AD-657 575 HC$3.00 MF$0.65

HUMAN FACTORS ENGINEERING BIBLIOGRAPHIC SERIES. VOLUME III. 1965 LITERATURE,
Tufts Univ Medford Mass Inst for Psychological Research
For primary bibliographic entry see Field 5E.
AD-657 590 HC$3.00 MF$0.65

R AND D ABSTRACTS. VOLUME 20 NUMBER 11, 1-15 JUNE, 1967.
Ministry of Technology London (England) Technical Information and Library Services
15 Jun 67, 71p
See also AD-656 142.

Descriptors: (*Abstracts, Scientific research), Great Britain.

The reports which are listed are catalogued by author, originator, report number, title, subject (Universal Decimal Classification) and contract and project numbers.
AD-657 594 HC$3.00 MF$0.65

COMPOSITION, COPYING, AND SEMI-MECHANIZED FILING AND SEARCHING DEVICES,
Herner and Co Washington D C
Saul Herner. Jul 67, 16p
AFOSR-67-2003
Contract AF 49 (638)-1424
Availability: Published in Technical Information Center Administration Conference (3rd) 1967.

Descriptors: (*Data processing systems, Instrumentation), Information retrieval, Data storage systems, Automation, Reproduction, Typewriters, Computers, Printing, Electrooptical photography.
Identifiers: Photocomposition.

The devices are: composition devices, for getting words and figures down on paper; photo- and microreproduction devices for copying and storing texts and figures, once conveyed to paper; and manual card and semimechanized card filing and searching devices for storing and manipulating documents and document records.
AD-657 734 Not available from CFSTI.

INFORMATION NEEDS AND USES IN SCIENCE AND TECHNOLOGY,
Herner and Co Washington D C
Saul Herner, and Mary Herner. Sep 67, 36p
AFOSR-67-2023
Contract AF 49 (638)-1424
Availability: Published in Annual Review of Information Science and Technology v2 1967.

Descriptors: (*Information retrieval, Reviews), Scientific personnel, Engineering personnel, Scientific research, Technical information centers, Documentation.

A critical review is presented of 26 publications on studies of information-gathering and communication among scientists and engineers, performed during 1965 and 1966. (Author)
AD-657 735 Not available from CFSTI.

THE PLACE OF THE SMALL LIBRARY IN THE NATIONAL NETWORK,
Herner and Co Washington D C
Saul Herner. 22 Jun 66, 5p
AFOSR-67-2005
Contract AF 49 (638)-1424
Prepared for presentation at the National Meeting of the American Chemical Society (151st), Pittsburgh, Pa., March 25, 1966.
Availability: Published in Journal of Chemical Documentation v6 p171-3 1966.

Descriptors: (*Libraries, Effectiveness), Information retrieval, Technical information centers, Industries, Scientific research, Dissemination, Documentation.

The paper analyzes the role of networks as they affect small libraries and information-users in environments that are lacking in adequate information resources and facilities. The function of field representatives in bridging the inevitable gap between major resource libraries and small libraries and individuals who can benefit from them is considered and discussed. (Author)
AD-657 736 Not available from CFSTI.

SYSTEM DESIGN, EVALUATION AND COSTING--IN PLAIN ENGLISH,
Herner and Co Washington D C
Saul Herner. 1 Mar 67, 17p
AFOSR-67-1998
Contract AF 49 (638)-1424
Prepared for presentation at ADI Inst. on Information Science, 15 Dec. 66.

Descriptors: (*Information retrieval, Management planning), Libraries, Indexes, Systems engineering, Optimization, Computers, Costs, Scheduling, Design.
Identifiers: Systems analysis, Evaluation.

The concepts of system design, evaluation, and costing are among the most often discussed and widely misunderstood in the information field. This report attempts, via case illustrations, to describe and explain the steps and processes involved, so as to take some of the mystery and witchcraft out of systems and to facilitate the return of design and operation of information services to where they rightfully belong: to the people who have the day-to-day job of making them go and perform. (Author)
AD-657 788 HC$3.00 MF$0.65

MOVE THE INFORMATION, A KIND OF MISSIONARY SPIRIT,
Air Force Office of Scientific Research Arlington Va Directorate of Information Sciences
Rowena W. Swanson. Jun 67, 203p
AFOSR-67-1247
Prepared for presentation at the Annual Meeting of the American Society for Engineering Education (75th), Michigan State Univ., East Lansing, 19-22 Jun 67.

Descriptors: (*Documentation, *Education), Technical information centers, Programmed instruction, Libraries, Computers, Data processing systems, Management planning, Computer personnel.

The paper records (a) plans and activities in the development and implementation of information systems in a variety of library and information center environments and (b) plans and programs for the education and training of people for the information, computer, and library sciences. The section on systems considers, in turn, the academic library, the public library, the industry-oriented library, and management applications. The discussion of accomplishments for these environments highlights not only mechanization of operations, but also user needs and how they are being met. The discussion includes, for example, summary analyses of Defense Documentation Center operations, California's Department of Motor Vehicles automated system, and several surveys of user habits and practices in acquiring information and information services. Curriculum development in the computer sciences is considered with respect to (a) factors arising from its multidisciplinary character and its vocation-type aspects, and (b) its potential impact, via computer-assisted instruction, on teaching methods and fundamental questions concerning education per se. Steps toward curriculum reform in the library sciences are reviewed. A bibliography is included that lists ref-

erences primarily to the 1966-1967 literature on mechanization of library operations, education for librarianship, systems implementations, and work in programmed instruction and computer-assisted instruction. (Author)
AD-657 794 HC$3.00 MF$0.65

THE MOORE SCHOOL INFORMATION SYSTEMS LABORATORY,
Pennsylvania Univ Philadelphia Moore School of Electrical Engineering
Morris Rubinoff. May 67, 31p
AFOSR-67-1952
Contract AF 49 (638)-1421

Descriptors: (*Documentation, Automation), Subject indexing, Information retrieval, Data processing systems, Electrical engineering, Classification, Vocabulary, Computer programs, Data storage systems, Graphics.

The report briefly describes the goals of the Moore School Information Laboratory which are primarily in the following tasks at the system level: specifications for machine storage of indexer aids, including lists of index items, synonymic equivalences, classification tables, and other semantic tools; organization of disk file storage; study of uses of graphic display. The report also summates the progress made in these tasks. (Author)
AD-657 809 HC$3.00 MF$0.65

THE COMPUTER--HERO OR VILLAIN,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5H.
AD-657 812 Not available from CFSTI.

AUTOMATED LITERATURE PROCESSING, HANDLING AND ANALYSIS SYSTEM: FIRST GENERATION.
Hayes International Corp Huntsville Ala Missile and Space Support Div
Jun 67, 508p
RSIC-549, ATLIS-17
Contract DAAH03-67-C-0019

Descriptors: (*Documentation, Systems engineering), (*Libraries, Automation), Data processing systems, Subject indexing, Analysis, Computers, Control systems, Classification, Data storage systems.
Identifiers: ALPHA literature analysis system.

The report presents a summary of the development and the characteristics of the first generation of the Automated Literature Processing, Handling and Analysis (ALPHA-1) System. Descriptions of the computer technology of ALPHA-1 and of the use of this automated library technique are presented. Each of the subsystems and modules now in operation are covered. While the discussion of various subsystems and their modules is not meant to be exhaustive, it provides a background for the reader who may be interested in adapting a part of or all of the ALPHA-1 System to another computer configuration or in another library environment. (Author)
AD-658 081 HC$3.00 MF$0.65

CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERIES.
Naval Ordnance Lab Corona Calif
For primary bibliographic entry see Field 10C.
AD-658 111 HC$3.00 MF$0.65

PHYSICAL FITNESS AND HUMAN TOLERANCE TO ACUTE EXPOSURE TO LIFE AT HIGH ALTITUDE. EXPERIMENTAL DESIGN AND DATA PROCESSING METHODOLOGY FOR CLINICAL PHYSIOLOGICAL OBSERVATIONS.
Saint Mary'S Hospital San Francisco Calif Dept of Medical Education
For primary bibliographic entry see Field 6P.
AD-658 185 HC$3.00 MF$0.65

R AND D ABSTRACTS, VOLUME 20 NUMBER 12, 16-30 JUNE 1967.
Ministry of Technology London (England) Technical Information and Library Services
30 Jun 67, 76p
See also AD-657 594.

Descriptors: (*Scientific research, Abstracts), Great Britain, Engineering, Industrial research.

The reports which are listed are catalogued in TIL by author, originator, report number, title, subject (Universal Decimal Classification) and contract and project numbers.
AD-658 303 HC$3.00 MF$0.65

LMSC PUBLISHED CONTRIBUTIONS, 1966 IMPRINTS: A CITATION BIBLIOGRAPHY,
Lockheed Missiles and Space Co Sunnyvale Calif
W. A. Kozumplik, and B. Vallejo. Feb 67, 27p
Rept no. LMSC-CB-67-1

Descriptors: (*Physics, Bibliographies), (*Aeronautics, Bibliographies), (*Astronautics, Bibliographies), (*Materials, Bibliographies), (*Electronics, Bibliographies), (*Engineering, Bibliographies), Astrophysics, Nuclear physics, Mechanics, Metallurgy, Ceramic materials, Solid state physics, Information retrieval, Propulsion, Bionics, Reports.

A listing is given of contributions by LMSC personnel published during 1966. Entries are arranged by author within the following categories: Physical sciences, aerospace sciences, materials sciencies, electronic sciences, engineering, miscellany.
AD-658 396 HC$3.00 MF$0.65

A REVIEW AND DISCUSSION OF LITERATURE CONCERNING TRANSIENT HEAT TRANSFER AND STEAM FORMATION,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 20M.
For abstract, see NSA 21 17.
IDO-17226 HC$3.00 MF$0.65

THE SOLID SYSTEM. II. NUMERIC COMPRESSION. THE SOLID SYSTEM. III. ALPHANUMERIC COMPRESSION,
National Bureau of Standards, Washington, D. C.
P. A. D. deMaine, K. Kloss, and B. A. Marron.
15 Aug 67, 48p
Hard Copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $0.30.

Descriptors: (*Coding, Algorithms), (*Information retrieval, Data storage systems), Technical information centers, Data processing systems, Graphics, Decoding, Flow charting.
Identifiers: Systems analysis, Alphanumeric symbols, NUPAK, ANPAK.

This part of NBS Technical Note 413 desribes the general NUMERIC COMPRESSOR (NUPAK) Algorithm for automatically compressing (encoding) or decoding compressed numerical information, which may of course have come from graphical information. The amount of compression achieved is determined by the 'lowest limit of significance,' the range, and the sequential patterns of the data to be stored. The encoded information can be stored in memory or on external storage devices in a small fraction of the space normally required, and can be expanded (decoded) item-by-item whenever needed by the system. An algorithm for compressing alphanumeric information is described. Because this ALPHANUMERIC COMPRESSOR (ANPAK) is fully automatic and self-organizing, it can operate on information which has already been compressed via the NUMERIC COMPRESSOR (NUPAK).
NBS-TN-413 HC$0.30 MF$0.65

NASA SPECIFICATIONS AND STANDARDS.
National Aeronautics and Space Administration, Washington, D. C.
May 67, 388p NASA-SP-9000

Descriptors: *Nasa program, *Standard, Administration, Aeronautics, Center, Electronics, Jet, Laboratory, List, Manned, Nation, Project, Propulsion, Research, Space, Specification.

For abstract, see STAR 05 20.
N67-34727 HC$3.00 MF$0.65

STUDY GROUP FOR SYSTEM DEVELOPMENT.
Kernforschungszentrum, Karlsruhe (West Germany).
For primary bibliographic entry see Field 5A.
For abstract, see STAR 05 20.
N67-34918 HC$3.00 MF$0.65

INDEXED BIBLIOGRAPHY ON TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ORNL-NSIC-33 HC$3.00 MF$0.65

A BIBLIOGRAPHY ON TRACER DIFFUSION IN METALS. SUPPLEMENT II. PART I. SELF-DIFFUSION IN PURE METALS. PART II. IMPURITY DIFFUSION IN PURE METALS. PART III. SELF AND IMPURITY DIFFUSION IN ALLOYS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
ORNL-3795-Suppl-2 HC$3.00 MF$0.65

MANAGEMENT OF CONTRACTOR DATA AND REPORTS. VOLUME II: AUTHORIZED DATA LIST.
Air Force Systems Command, Washington, D. C.
1 Jul 67, 138p AFSCM/AFLCM-310-11-Vol-2
See also PB-172 870-H.

Descriptors: (*Data , Processing), (*Reports, Processing), Costs, Documentation, Management control systems, Military requirements, Instruction manuals.

The directive prescribes management procedures approved by the Air Force Systems Command and the Air Force Logistics Command to keep to a practical minimum the essential data required from defense contractors. Volume II contains the maximum allowable Data Items from which the essential data requirements are to be selected for a given program. Data Items are in the following functional categories: Administrative and financial, configuration management, engineering data support, facilities, handbooks, logistics, management/PERT, procurement and production, personnel subsystems, reliability/maintainability, system/subsystem analysis, test and provisioning.
PB-172 870-I HC$3.00 MF$0.65

CURRICULUM FOR THE INFORMATION SCIENCES. REPORT NO. 8: A MANUAL OF EXPERIMENTS IN DOCUMENTATION,
Lehigh Univ., Bethlehem, Pa. Center for the Information Sciences.
John O'Connor. Jun 67, 70p

Grant NSF-GE-2509
See also PB-168 454 and PB-175 685.

Descriptors: (*Documentation, *Education), Computers, Abstracts, Subject indexing, Indexes, Information retrieval, Effectiveness, Statistical analysis.
Identifiers: Information sciences, Thesauri.

Contents: Thesaurus relations between titles and index terms; Seriously incomplete references in documentation literature; Can 'See--' entries in a thesaurus be generated by computer; Abstract publications and author abstracts; Subject slanting in abstract publications; Reasons for indexers' selections; Meanings of a frequently used and somewhat ambiguous indexing term in documents indexed with that term; Distinguishing invented from genuine retrieval requests; Searching a KWIC index; Searching an index; Request formulation for a title SDI service; Documents matched to requests on the basis of titles, authors, abstracts, and full texts; Non-citation-index searches for papers which confirm, apply, criticize, or correct a given paper; Categorizing citation relations; False assignments by title-term thesaurus relations; Statistical association to compensate for inadequate indexing; Associations to retrieved documents and to relevant retrieved documents for request modification; Searched collection vs. total collection as a basis for statistical associations.
PB-175 682 HC$3.00 MF$0.65

CURRICULUM FOR THE INFORMATION SCIENCES. REPORT NO. 9: SYLLABUS FOR A COURSE IN FILE MANAGEMENT,
Lehigh Univ., Bethlehem, Pa. Center for the Information Sciences.
John M. Carroll. Jun 67, 20p
Grant NSF-GE-2569
See also PB-175 682.

Descriptors: (*Documentation, *Education), (*Data storage systems, Education), Information retrieval, Management engineering, Processing, Data processing systems, Computers, Search theory.
Identifiers: Information sciences.

The course treats the organization and structure of files; relationships between information representation and processing techniques; transformations between storage media; and the referencing of information as related to the structure of its representation. The intent of the course is fourfold: (a) To teach the underlying principles of file organization, structure, manipulation and utilization; (b) To unify the basic concepts of information handling in the engineering, information, life, physical, social and management sciences; (c) To give the student practical experience in planning, implementaing, evaluating, optimizing, and documenting file management procedures using manual, electromechanical and electronic equipment; (d) To apply principles of file organization and information handling to the design of information systems taking into account the content of the files, needs of the user, and characteristics of data-processing equipment to be used. (Author)
PB-175 685 HC$3.00 MF$0.65

SURVEY OF COMPUTER-PROGRAM DOCUMENTATION PRACTICES AT SEVEN FEDERAL GOVERNMENT AGENCIES.
Final rept.,
Computing Technology, Inc., Paramus, N. J.
Bernard E. Scott, Hugh McGeehan, Robert Jones, and Donald Lytle. 31 Mar 67, 118p
Contract CST-308

Descriptors: (*Documentation, *Computer programs), (*Programmers, Documentation), (*Government employees, Programmers), United States Government, Attitudes, Questionnaires, Data processing systems, Programming (Computers), Standards.

Guidelines for establishing documentation requirements on a sound, rational basis would be of distinct help to EDP management. Programmers, when properly motivated, recognize the need to document their work, and if their responses can be taken at face value, they are more than ready to generate what is needed. Programmers in general lack an essential ingredient necessary for high quality documentation - namely, the ability to write for the needs of others. Standards for program documentation are a mixed blessing. When implemented, they prevent anarchy in the documentation picture, but they can also be responsible for much unnecessary documentation. It is the firm opinion of the survey team that the defect of all standards is their rigidity. Documentation problems are inherently fewer in EDP organizations where the design, implementation and maintenance functions are performed by a single task force.
PB-175 701 HC$3.00 MF$0.65

URBANDOC THESAURUS.
New York Univ., N. Y.
May 67, 196p
Prepared in cooperation with New York City Planning Commission.

Descriptors: (*Urban planning, Documentation), (*Information retrieval, *Dictionaries), Subject indexing, Automation, Urban areas, Vocabulary, Data storage systems.
Identifiers: URBANDOC thesaurus.

Project URBANDOC is in the midst of a three-year effort to test the feasibility of automating bibliographic retrieval in disciplines associated with urban renewal. Functionally the system can be described as the electronic equivalent of a library catalogue, but greatly augmented. The individual input units consist of author, title, and other identifying publication data, in association with the index terms that characterize the contents of the documents. Collectively, and in machine-readable form, these records form the data base. Against it are performed the searches, to retrieve those books and articles which satisfy the parameters of the specific requests. The Project uses a programming system developed by IBM for the 1401 computer. It requires a controlled vocabulary -- or authorized list of descriptors. This list, with the addition of cross-references and scope notes, is presented. This first reproduction and distribution of the URBANDOC thesaurus in a 'field-test' edition is preliminary to a more definitive publication. (Author)
PB-175 702 HC$3.00 MF$0.65

STUDIES OF THE FLOW OF TECHNICAL INFORMATION. I. A SURVEY IN SELECTED INDUSTRIAL LABORATORIES. II. A SURVEY OF SELECTED MEMBERS OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS. III. STUDIES OF DECISION-MAKING IN DEVELOPMENT PROJECTS.
Final rept.,
Harvard Univ., Cambridge, Mass. Graduate School of Business Administration.
Richard S. Rosenbloom. 30 Jun 67, 7p
Grant NSF-GN-305
See also PB-169 327.

Descriptors: (*Information retrieval, Industries), Electronics, Engineering personnel, Decision making, Electrical engineering, Management engineering, Social communication.
Identifiers: Research and development.

A study was made on the flow of technical information and its role in research and development decision making.
PB-175 714 HC$3.00 MF$0.65

EVALUATION OF THE CLASS 167 COMBINED COORDINATE INDEX-CONVENTIONAL CLASSIFICATION SYSTEM,
Westat Research, Inc., Bethesda, Md.
D. W. King, and P. M. McDonnell. Jun 67, 33p
WR-PO-18
Contract C-2-67

Descriptors: (*Subject indexing, Patents), (*Classification, Patents), (*Information retrieval, Patents), Effectiveness, Errors, Mathematical models, Accuracy, Costs, Statistical analysis.
Identifiers: Coordinate indexing.

There were five major system components in which alternatives were considered in the system design. These components are as follows: (1) term list and structure, (2) procedure for analyzing, indexing and coding information, (3) storage and search devices, (4) retrieval devices, (5) search procedures and strategies. Six decision areas related to these components are shown. Two experiments were conducted to provide information for choosing among alternatives for the five system components. These experiments were an indexing experiment and a preliminary search experiment. Both of these experiments were performed in the initial phase of file development after the first 500 documents were indexed. The report describes the two experiments and information found from the experiments which is related to the five decision areas. (Author)
PB-175 744 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS, JUNE 1951-MAY 1953. SUPPLEMENT NO. 2.
National Advisory Committee for Aeronautics, Washington, D. C.
15 Dec 53, 239p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, and research equipment and techniques. Subject and author indexes are included.
PB-175 751 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JUNE 1953-MAY 1954. SUPPLEMENT NO. 3.
National Advisory Committee for Aeronautics, Washington, D. C.
1 Sep 54, 227p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, and research equipment and techniques. Subject and author indexes are included.
PB-175 752 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JUNE 1955-JUNE 1956. SUPPLEMENT NO. 5.
National Advisory Committee for Aeronautics, Washington, D. C.
1 Dec 56, 239p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, and research equipment and techniques. Subject and author indexes are included.
PB-175 753 HC$3.00 MF$0.65

INDEX OF NACA TECHNICAL PUBLICATIONS JULY 1956-JUNE 1957. SUPPLEMENT NO. 6.
National Advisory Committee for Aeronautics, Washington, D. C.
1 Dec 57, 280p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, and research equipment and techniques. Subject and author indexes are included.
PB-175 754 HC$3.00 MF$0.65

INDEX OF NASA TECHNICAL PUBLICATIONS, OCTOBER, 1958 JUNE, 1959.
National Aeronautics and Space Administration, Washington, D. C.
1959, 180p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, and research equipment and techniques. Subject and author indexes are included.
PB-175 769 HC$3.00 MF$0.65

INDEX OF NASA TECHNICAL PUBLICATIONS, JULY, 1959 JUNE, 1960.
National Aeronautics and Space Administration, Washington, D. C.
1960, 260p

Descriptors: (*Indexes, *Aeronautics), Bibliographies, Reports, Aerodynamics, Hydrodynamics, Propulsion, Loading (Mechanics), Construction, Materials, Meteorology, Instrumentation, Aircraft, Spacecraft, Astronautics.

Publications on the following subjects are listed: aerodynamics, hydrodynamics, propulsion, loads and construction, materials, meteorology, operating problems, instruments, research equipment and techniques, space operations, and space sciences. Subject and author indexes are included.
PB-175 770 HC$3.00 MF$0.65

A LINGUISTIC APPROACH TO RELEVANCE JUDGMENT.
Technical rept.,
Case Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
Madagula I. Sastri. Jul 67, 17p CSL-TR-12
Grant PHS-FR-00118

Descriptors: (*Information retrieval, Acceptability), Linguistics, Decision making, Semantics.
Identifiers: Relevance (Documentation).

It was the principal effort of the paper to propose a lexically-oriented approach to the judgment of relevance, for it is believed that, no matter what other ambiguous factors operate on the mind of the user, he is primarily guided by the presence of the words and word-combinations that he has specifically mentioned in his question. If he then realizes that he really needs something else, the original question forms the basis for further inquiry. In other words, insofar as relevance is objective, its identification/prediction is largely bound to be dependent on the actual matching of the question-answer structures. The report also touched on the question of frequency and the possibility of its application to a study of relevance together with the linguistic criteria. (Author)
PB-175 800 HC$3.00 MF$0.65

AUTOMATIC PROCESSING OF METALLURGICAL ABSTRACTS FOR THE PURPOSE OF INFORMATION RETRIEVAL.
Final technical rept.,
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
Jessica S. Melton. 1 Jul 67, 104p
NSF-4-F

Descriptors: (*Metallurgy, Information retrieval), (*Abstracts, Data processing systems), (*Information retrieval, Automation), Subject indexing, Search theory, Experimental design.

The experiment was a first attempt to measure the performance of a fully automated text-based document retrieval system against that of an operational system in which the searching, though not the indexing, was mechanized. The findings were seriously limited by the fact that the text that was processed for the experiment was not the same as the text that was evaluated when relevance judgments were made. Nevertheless, the results show the magnitude of the discrepancy between the actual performance of an operational mechanized searching system and a text-based fully-automated retrieval system, indicating that automated systems will have to work out techniques to narrow the gap. (Author)
PB-175 807 HC$3.00 MF$0.65

A COMPUTER ORIENTED SCHEME FOR CODING CHEMICALS IN THE FIELD OF BIOMEDICINE.
Technical rept.,
Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
Marilyn E. Bobka, and J. B. Subramaniam. Jul 67, 25p CSL-TR-11
Grant PHS-FR-00118

Descriptors: (*Coding, *Chemical compounds), (*Drugs, Coding), Biochemistry, Chemicals, Organic compounds, Computers, Information retrieval.
Identifiers: Chemical notation systems.

A new technique for the computer handling of biomedical data was developed. It is a chemical notation in which complicated chemical structures may be expressed concisely by a single line of letters and numbers. It is a straightforward way of coding chemical compounds for mechanical retrieval and so to a degree bypasses the present confusion and frustration existing in chemical nomenclature. Despite the limitations and faults in the coding scheme, a relatively high degree of inter- and intra-coder consistency was achieved. (Author)
PB-175 808 HC$3.00 MF$0.65

OFFICE OF STATE TECHNICAL SERVICES FIRST ANNUAL REPORT FISCAL YEAR 1966,
Department of Commerce, Washington, D. C. Office of State Technical Services.
Paul J. Grogan. 1966, 69p

Descriptors: (*Documentation, Industries), (*Technical information centers, United States Government), Scientific research, Commerce, Management engineering, Dissemination, Economics, Engineering, Training, Reports.
Identifiers: Office of State Technical Services, Technology.

The fiscal year 1966 program obtained the interest and support of more than 1,000 of America's most knowledgeable individuals in the design and conduct of programs that are oriented toward the diffusion of science and technology into the main stream of United States commerce, business and industry. The 'technical services' are in three main categories: (1) Preparing and disseminating of technical reports, abstracts, computer tapes, microfilm, reviews, and similar scientific or engineering information, including the establishment of State or interstate technical information centers for such purpose. (2) Providing a reference service to identify sources of engineering and other scientific expertise. (3) Sponsoring industrial workshops, seminars, training programs, extension courses, demonstrations and field visits designed to encourage the more effective application of scientific and engineering information.
PB-175 820 HC$3.00 MF$0.65

COMBINED SUBJECT AND AUTHOR INDEXES TO RADIOBIOLOGY BIBLIOGRAPHIES TID-3097, BIOLOGICAL EFFECTS OF IONIZING RADIATION AND TID-3098, THE EFFECTS OF RADIATION AND RADIOISOTOPES ON THE LIFE PROCESSES,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
TID-3099 HC$3.00 MF$0.65

NUCLEAR ENERGY FOR WATER DESALTING. A BIBLIOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
TID-3584-Rev-1 HC$3.00 MF$0.65

5C. Economics

THE DEVELOPMENT OF HAUPTAUSSCHUESSE UND RINGE IN THE GERMAN WAR ECONOMY,
Rand Corp Santa Monica Calif
Edward R. Zilbert. Aug 67, 18p Rept no. P-3649

Descriptors: (*Industrial production, Control), (*Economics, *Mobilization), Industries, Economic warfare, Leadership, West Germany, Political science, Organizations, Commerce, Money.
Identifiers: Hauptausschuesse und ringe.

The system of Main Committees and Rings replaced military control over production with control by civilian experts drawn from the industries being supervised. These were directed in turn by the Ministry of Armaments and War Production. In general, the Main Committees were in charge of the end product and the Rings were responsible for components.
AD-658 002 HC$3.00 MF$0.65

ECONOMIC BASE SURVEY OF THE POTOMAC RIVER SERVICE AREA. VOLUME IX, APPENDIX L. POTOMAC RIVER BASIN REPORT.
Office of Business Economics Washington D C
1961, 100p
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.55.

Descriptors: (*Water supplies, *Potomac River), (*Water, Consumption), District of Columbia, Economics, Population, Employment, Wages, Money, Industrial production, Distribution.

The recent comparative growth of the United States and the Potomac River Service Area--meas-

ured in broad terms of output, employment, and population--and the future growth as projected over the next half century are summarized. The major findings derive from an intensive analysis of the economic growth of the Potomac Basin relative to the United States economy over the last three decades, and from basic assumptions as to the future. The Office of Business Economics has developed a measure to evaluate the progress of the United States economy over the last half century. This is the total of the gross national product, which covers all types of output. This all-inclusive output measure has increased over that period at an average rate of 3 percent per year--equivalent to a doubling of production every 23 years. Most of this expansion can be traced to an increased productivity, arising primarily from technological and managerial progress and a high rate of capital formation, along with the steady development of natural resources, a growing labor force, and constant advances in the education and skills of the working population. The mobility of our labor force has also contributed, by shifting workers into activities in which they could be more productive, and so have the economies of large scale production.
AD-658 165 MF$0.65

THE DOMESTIC AIR FREIGHT INDUSTRY AND INTRODUCTION OF LARGE SUBSONIC TRANSPORTS,
Analytic Services Inc Falls Church Va
For primary bibliographic entry see Field 1B.
AD-658 397 HC$3.00 MF$0.65

THE CONTRIBUTION OF SOVIET ESTONIA,
Department of the Army Washington D C
E. Andrusov, M. Grinevskii, and V. Myagi. 24 Jul 67, 6p Rept no. J-2033
TT-67-62873
Vklad Sovetskoi Estonii, trans. of mono. Vneshnyaya Torgovlya, Moscow, 1966 p38-41.

Descriptors: (*Industrial production, *USSR), Commerce, Economics, Industries, Shipping (Marine).
Identifiers: Estonian SSR.

The growth of industrial production by Estonian enterprises during the Seven Year Plan is described. Emphasis is placed on the diversity of high quality capital and other goods being delivered for export, mainly from the Tallin Commercial Seaport. (Author)
AD-658 400 HC$3.00 MF$0.65

OPTIMAL ALLOCATION IN A PURE CAPITAL MODEL WITH WITHDRAWALS - ASYMPTOTIC PROPERTIES AND ALGORITHMS.
Stanford Univ., Calif. Dept. of Statistics.
A. J. Seelenfreund. 31 May 67, 83p NASA-CR-87431, TR-95
Contracts NONR-225/53/, NONR-225/50/
Sponsored in Part By Nasa

Descriptors: *Algorithm, *Asymptotic method, *Numerical analysis, Allocation, Analysis, Asymptote, Economics, Mathematics, Method, Model, Numerical.

For abstract, see STAR 05 20.
N67-34373 HC$3.00 MF$0.65

DEVELOPMENT COUNSELING FOR ECONOMIC GROWTH.
Biennial rept. no. 1, 1 Feb 64-31 Dec 66.
Boston Univ., Mass. Area Development Center.
Dec 66, 85p
Contract Cc-6111

Descriptors: (*Economics, Massachusetts), Organizations, Labor, Universities, Employment, Urban areas, Training, Commerce, Wages, Budgets, Population, Housing, Education, Industries.
Identifiers: Area redevelopment.

The Boston University Area Development Center initiated an experimental multi-service development counseling program through an Economic Development Administration technical assistance contract. The program was organized to provide assistance in designated Massachusetts redevelopment areas distressed by chronic, high unemployment. Between February 1964 and December 1966, the Center aided development efforts in ten redevelopment areas through five general categories of service: Business counseling; Development opportunity studies; Development counseling and research assistance to development organizations; Assistance to public agencies and officials; Informational services. (Author)
PB-175 705 HC$3.00 MF$0.65

THE POTENTIAL MARKET FOR MIDWESTERN AND ALASKAN COAL AND LIGNITE.
Nathan (Robert R.) Associates, Inc., Washington, D. C.
Aug 66, 381p
Contract DI-14-01-0001-475

Descriptors: (*Coal, Economics), Commerce, Population, Fuels, Fuel consumption, Industrial production, Transportation, Power supplies, Nuclear power plants, Fuel oil, Gases, Electric power production, Predictions, Alaska, Arkansas, Iowa, Kansas, Louisiana, Nebraska, North Dakota, Minnesota, Oklahoma, South Dakota, Texas.

Results of a study of coal resources and potential markets in the 11 West Central states (those extending from Minnesota and the Dakotas in the north to Louisiana and Texas in the south) are reported. Topics include: Population and economic growth prospects; energy sources and consumption trends; the supply and price of coal from midwest sources; transport costs; the supply and price of fuel oil and natural gas; nuclear power generation costs; the potential market for midwest coal for the generation of electricity; the potential market for metallurgical coal; the potential market for midwest coal and lignite in the manufacturing sector; the potential market for residential and commercial. A similar study of Alaskan coal production and requirements is also reported.
PB-175 738 HC$3.00 MF$0.65

COST OF MOWING ROADSIDES IN INDIANA.
Indiana State Highway Commission. Div. of Maintenance.
For primary bibliographic entry see Field 13B.
PB-175 756 HC$3.00 MF$0.65

HIGHWAY BEAUTIFICATION STUDY: MAINE AND NEW HAMPSHIRE,
Smith (Wilbur) and Associates, New Haven, Conn.
For primary bibliographic entry see Field 13B.
PB-175 760 HC$3.00 MF$0.65

MOTOR TRUCK FACTS.
Automobile Manufacturers Association, Detroit.
For primary bibliographic entry see Field 13F.
PB-175 767 HC$3.00 MF$0.65

FEASIBILITY STUDY: TOWN DOCK AND MARINA HARBORSIDE, TOWN OF BROOKSVILLE, MAINE.
Fleming (H. B.), Inc., South Portland, Maine.
5 May 67, 25p
Prepared in cooperation with the Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Maine), Feasibility studies, Site selection, Harbors, Piers, Structures, Costs, Rock (Geology), Construction materials.

Contents: Location of project; Physical requirements of Callahan Mining and the town for dock and Marina; Recommendations for facilities; Cost estimate. (Author)
PB-175 799 HC$3.00 MF$0.65

OFFICE OF STATE TECHNICAL SERVICES FIRST ANNUAL REPORT FISCAL YEAR 1966,
Department of Commerce, Washington, D. C. Office of State Technical Services.
For primary bibliographic entry see Field 5B.
PB-175 820 HC$3.00 MF$0.65

MARKETS FOR HAWAII HARDWOOD LUMBER IN NEW SINGLE-FAMILY HOUSES ON OAHU, HAWAII.
Research paper,
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
John D. Zinnikas, and R. Sidney Boone. 1967, 15p RP-PSW-41

Descriptors: (*Commerce, Construction), (*Housing, Hawaii), (*Wood, Construction), Floors, Costs, Structures, Consumption, Tables.

The total potential market for flooring, siding, and cabinet and millwork in new single-family houses on Oahu was between 10 1/2 and 11 million board feet of lumber in 1963. The total possible market for lumber in new single-family house construction from 1965 to 1970 is estimated at 18 to 23 million square feet of flooring, 28 to 36 million square feet of siding, and 7 to 9 1/2 million square feet in cabinets. (Author)
PB-175 955 HC$3.00 MF$0.65

5D. History, Law, and Political Science

FRANCO-SOVIET RELATIONS TODAY,
Rand Corp Santa Monica Calif
Alfred Grosser. Aug 67, 103p Rept no. RM-5382-PR
TT-67-62794
Contract F44620-67-C-0045
Unidentified mono.
Availability: Published in copywrited journal. Hard copy available from RAND Corp., Santa Monica, Calif., $4.00.

Descriptors: (*Government (Foreign), Europe), (*Foreign policy, France), USSR, Political science, United States government, Vietnam, West Germany, Communism, Economics, Leadership, Communists, Public opinion, Culture, Propaganda, Arms control, Nuclear weapons.

An analysis is made of French policy toward the Soviet Union since World War II against the background of Franco-American and Franco-German relations and of French domestic affairs. The return of General de Gaulle to power during the Algerian war and the construction of the Fifth Republic around him mark an important divide in French politics--a new concentration of French policy on the enhancement of France's rank among the states of Europe and of the world. De Gaulle's maneuvers to achieve a position of power for France are described. Although for the time being, De Gaulle finds no compelling reasons, international or domestic, to change his approach to foreign policy, the question remains: How long will the costs of these policies to French interests be considered as justified by the benefits. (Author)
AD-657 748 Not available from CFSTI.

REVIEW OF THE CHINESE COMMUNIST ARMY IN ACTION: THE KOREAN WAR AND ITS AFTERMATH; THE CHINESE PEOPLE'S LIBERATION ARMY,

Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15G.
AD-657 753 Not available from CFSTI.

REVIEW OF 'DOMESTIC SOURCES OF FOREIGN POLICY',
Rand Corp Santa Monica Calif
Paul Y. Hammond. Sep 67, 5p Rept no. P-3675
Availability: Published in American Political Science Review.

Descriptors: (*Foreign policy, United States), (*United States government, *Political science), Public opinion, Attitudes, Cold war, Leadership, Social sciences, Reviews.

The book demonstrates at once that work of impressive quality has been done on the foreign relations function of government, the inadequacy of general theory on the subject, and some significant gaps in the field. Taking account of the fact that most of the items here do not address the central issues of the book, the gaps it makes evident are (1) verified propositions about the relationships between internal and external variables; (2) comparable frames of reference for comparing domestic and foreign policy issue-areas, particularly the variations in public attentiveness and activity; (3) findings about the processing of policy where the linkage between domestic sources and foreign policy behavior can be observed as a process.
AD-657 927 Not available from CFSTI.

THE LAW OF THE SEA: OFFSHORE BOUNDARIES AND ZONES.
Final rept. 31 Mar 66-31 Mar 67,
Rhode Island Univ Kingston Law of the Sea Inst
Lewis M. Alexander. Aug 67, 340p
Contract Nonr-396 (16)
Availability: Hard copy available from Ohio State University Press, 2070 Neil Avenue, Columbus, Ohio, $12.50.

Descriptors: (*Oceans, *International law), Inland waterways, Economics, Seacoast, Navigation, Straits, Natural resources, Law, Fishes, Industries, Geology, Minerals, Geophysical prospecting, Ocean bottom, Treaties, Control, Terrain.

The book contains nineteen chapters, comprising papers and discussions from the conference. The theme of the conference was, first, whether the present limits of United States jurisdiction in the oceans are sufficient for the national needs; and, second, what alternative types of controls might be established for the high seas beyond national limits. Changing technological, economic, and political conditions are forcing a re-evaluation of certain aspects of the law of the sea. Among the topics covered in this book are fisheries resources in offshore waters, mining in the sea, the law and new technologies, and international control of high seas' resources. (Author)
AD-657 985 Not available from CFSTI.

IS THERE A LONG-RUN TREND TOWARD CONCENTRATION IN THE INTERNATIONAL SYSTEM,
Rand Corp Santa Monica Calif
Bruce M. Russett. Aug 67, 32p Rept no. P-3666

Descriptors: (*Population, Statistical distributions), Political science, Random variables, Determinants, Statistical tests, Curve fitting, Predictions, Stability, United Nations.

Evidence available as to trends in the distribution of nations by population size is examined. The data include information on the 'birth' and 'death' of nations of various sizes, population growth rates, and static data for the distribution of nations by size at particular points in time and from which we can test some inferences about random processes that might have generated those distributions. To anticipate, the available data are ambiguous but at least there is no good evidence that the distribution is changing or that there are forces at work which are notably increasing or weakening the degree of concentration.
AD-658 010 HC$3.00 MF$0.65

FIFTY YEARS AFTER OCTOBER: PARTY AND SOCIETY IN THE USSR,
Rand Corp Santa Monica Calif
Arnold L. Horelick. Sep 67, 70p Rept no. P-3630
Availability: Published in Wayne State Univ. Press 1968 in The Future of Communism in Europe.

Descriptors: (*Management engineering, *Industrial production), (*Leadership, *Government (Foreign)), Communism, USSR, Predictions, Agriculture, Communication systems, Economics, Behavior, Decision making, Armed forces (Foreign), Cold war, Problem solving, Probability, Police.

The purpose now is only to identify the principal goal attributed to the Soviet system (i.e., to the ruling elite) in the totalitarian model. The totalitarian model singles out maximization of political power and control, or in the words of one writer, 'complete order and predictability of human behavior.' A totalitarian regime strives to perfect a system that can achieve total mobilization and coordination of society. This is true even in a totalitarian system whose official ideology regards the complete withering away of the state as the highest point of social development. It makes no essential difference, according to the totalitarian model, whether the leaders become cynical about those aspects of the ideology that are most anthithetical to the operation of the system, or whether they rationalize the discrepancies (as in Communist systems, by liberal employment of the dialectic). The totalitarian model, then postulates the acquisition, maintenance and extension of political power and control over human behavior as the overarching purpose of the system; the totalitarian regime monopolizes the political life of society while denying autonomy to all non-political spheres and actors.
AD-658 251 Not available from CFSTI.

THE VIETNAMESE REFUGEE COMMUNITIES IN NORTHEAST THAILAND,
Joint Research and Test Activity San Francisco Calif 96243
For primary bibliographic entry see Field 5I.
AD-658 283 Not available from CFSTI.

COMMUNIST OUTLOOK ON WAR,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15G.
AD-658 393 Not available from CFSTI.

5E. Human Factors Engineering

HUMAN FACTORS IN PANEL DESIGN,
Johns Hopkins Univ Baltimore Md
Eliot Stellar. 1949, 23p
SPECDEVCEN-166-1-99
Contract N5ori-166 (01)
Availability: Published in Human Factors in Undersea Warfare, National Research Council of Canada, p153-75 1949.

Descriptors: (*Control panels, *Human engineering), Display systems, Design, Performance (Human), Anthropometry, Operators (Personnel), Efficiency, Instrument panels, Man-machine systems.

General principles and some quantitative data are presented on six major aspects of panel layout: (1) the practical limits of the working area, including the position of the operator and the orientation of the panel, (2) the optimal location of controls and displays, (3) the importance and frequency of use of controls and displays, (4) the patterning of controls and displays, (5) the distribution of work over the body parts, and (6) the confusion of controls and of displays.
AD-657 547 Not available from CFSTI.

HUMAN FACTORS ENGINEERING BIBLIOGRAPHIC SERIES. VOLUME III. 1965 LITERATURE,
Tufts Univ Medford Mass Inst for Psychological Research
Paul G. Ronco. May 67, 544p
HEL-BIB-3
Contracts DA-18-001-AMC-1004 (X), Nonr-494 (13)
See also Volume 1, AD-639 906 and Volume 2, AD-649 568.

Descriptors: (*Human engineering, Bibliographies), Indexes, Abstracts, Documentation.

This bibliography is the third in a planned series of bibliographies of literature pertinent to the field of human factors engineering. It covers literature of 1965. This bibliography consists primarily of: (1) an index to the human factors literature, and (2) the annotated bibliography.
AD-657 590 HC$3.00 MF$0.65

THE EFFECTS OF SIZE AND BRIGHTNESS ON THE SPEED OF IDENTIFYING NUMBER OF RANGE RINGS.
Johns Hopkins Univ Baltimore Md Psychological Lab
For primary bibliographic entry see Field 5J.
AD-657 622 HC$3.00 MF$0.65

TRAINING 90 MM AA GUN CREWS. APPENDIX IV. TRAINING AIDS AND DEVICES.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 5I.
AD-657 947 HC$3.00 MF$0.65

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED AIRCREWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS: (COMPARISONS OF TW 6 HEIGHTS OF CROTCH PROTECTOR AND THREE SUSPENSION SYSTEMS).
Army Natick Labs Mass Pioneering Research Div
For primary bibliographic entry see Field 6Q.
AD-658 034 HC$3.00 MF$0.65

INJURY EXPERIENCE IN ARMY HELICOPTER ACCIDENTS,
Army Board for Aviation Accident Research Fort Rucker Ala
For primary bibliographic entry see Field 1B.
AD-658 079 HC$3.00 MF$0.65

THE VALUE OF TIME FOR PASSENGER CARS: AN EXPERIMENTAL STUDY OF COMMUTERS' VALUES. VOLUME II.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 13F.
PB-175 731 HC$3.00 MF$0.65

5G. Linguistics

A STUDY OF THE REPRESENTATION OF ENGLISH VOWEL PHONEMES IN THE ORTHOGRAPHY,
University Coll London (England)
Eleanor M. Higginbottom. 1962, 52p
Contract AF 61 (514)-1176
Availability: Published in Language and Speech v5 pt2 p67-117 Apr-Jun 1952.

Descriptors: (*English language, *Phonetics), Speech, Correlation techniques, Great Britain.

Group 5G—Linguistics

A study was made of the correlation between the written and spoken forms of English, as part of a project for the construction of a machine to derive from printed text the corresponding forms of the spoken language. The units selected for correlation were phonemes and graphemes. A tentative list of correspondences was drawn up for each phoneme, on an intuitive basis. This list was checked by the counting of correspondences occurring in a sample of text, refinements and changes in the statement of graphemic sequences being introduced as the need arose. The correspondences were then re-formulated as rules for the prediction of phonemes from graphemic sequences. It was found that the correlation could be simplified by taking account of the reflection in the orthographic system of certain grammatical patterns, and by fusion of some sequences, in particular those containing the grapheme r, with other sequences having different phonemic correspondents. The accuracy of the resulting set of correlations is not complete. Inaccuracies are due to either the rare occurrence of a correspondence (in which case it is not accounted for in the conversion rules), or the lack of a consistent graphemic environment by reference to which different correspondents of a single sequence might be specified (in which case correspondents are assigned randomly in the ratio to each other in which they occurred in the sample). It proved possible, however, to specify the more frequent correspondences with a high degree of accuracy. (Author)
AD-657 860 Not available from CFSTI.

A PRELIMINARY INVESTIGATION OF CERTAIN ASPECTS OF INTONATION,
University Coll London (England)
For primary bibliographic entry see Field 17B.
AD-657 861 Not available from CFSTI.

RESEARCH ON SYNTACTIC ANALYSIS.
Final administrative rept. 1 Jan 64-30 Sep 66,
Ohio State Univ. Research Foundation, Columbus.
Charles J. Fillmore. Jun 67, 4p
Grant NSF-GN-174

Descriptors: (*Syntax, Analysis), (*English language, Syntax), (*Chinese language, Syntax), Grammars.
Identifiers: Mandarin.

The project was concerned with basic research on the syntactic properties of natural languages, with the especial aim of determining precise ways of stating structrual differences between different languages. The two languages of immediate concern were Mandarin Chinese and American English. The research tasks consisted of constructing sections of precise grammars of these languages, formulating algorithms for converting grammars into sentence-producing devices, and examining such metalinguistic questions as 'grammatical rule type' and 'ordering and subgrouping of grammatical rules'. (Author)
PB-175 716 HC$3.00 MF$0.65

A LINGUISTIC APPROACH TO RELEVANCE JUDGMENT.
Case Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
For primary bibliographic entry see Field 5B.
PB-175 800 HC$3.00 MF$0.65

5H. Man-Machine Relations

RAPID SCREENING OF TACTICAL IMAGERY AS A FUNCTION OF DISPLAY TIME.
Technical research note,
Army Behavioral Science Research Lab Washington D C
James A. Thomas, and Robert Sadacca. Jun 67, 30p Rept no. BESRL-TRN-189

Descriptors: (*Photointerpreters, Performance (Human)), Viewing screens, Time, Effectiveness, Tactical warfare, Display systems, Analysis of variance, Photointerpretability.

An experimental study was made to assess the effectiveness of two techniques for rapid screening to select imagery frames of high military potential and to determine the effects of variations in display time on screening performance. Two samples of image interpreters, each consisting of three matched groups, screened three sets of imagery at three different display time intervals (5, 15, and 25 seconds per frame for Sample 1; 10, 20, and 30 seconds per frame for Sample 2). Each interpreter was instructed to perform two screening functions while scanning each print-- (1) annotate on the frame all areas of military activity he detected; and (2) assign to each print a priority rating of High, Medium, or Low to indicate estimated intelligence value of the frame. Interpreter performance under the two methods was compared in terms of accuracy and validity of the annotations and priority ratings across the six screening time intervals. Results of the study definitely favored the priority ratings technique over annotation screening. The ratings, of high accuracy even with short viewing time, improved significantly both in accuracy and in validity with longer display time. Generally, performance was better on the measures which were less complex and showed fewer target areas. Validity of the number of annotations on a frame, generally low, did not vary significantly with display time. More incorrect as well as correct annotations were made, a finding similar to previous BESRL findings for unspeeded interpretation performance. (Author)
AD-657 584 HC$3.00 MF$0.65

THE EFFECTS OF SIZE AND BRIGHTNESS ON THE SPEED OF IDENTIFYING NUMBER OF RANGE RINGS.
Johns Hopkins Univ Baltimore Md Psychological Lab
For primary bibliographic entry see Field 5J.
AD-657 622 HC$3.00 MF$0.65

THE COMPUTER--HERO OR VILLAIN,
Rand Corp Santa Monica Calif
Martin Greenberger. Aug 67, 17p Rept no. P-3656
Availability: Published in Johns Hopkins Magazine, Fall 1967.

Descriptors: (*Man-machine systems, Attitudes), (*Education, Computers), (*Information retrieval, Computers), (*Computers, Attitudes), Decision making, Automation, Performance (Engineering).
Identifiers: Computer-aided instruction, On-line systems.

It is human to be fearful and distrustful of a stranger. The computer, less than twenty years since its appearance upon the commercial scene, is still a relative stranger to our times. Strangers tend to look gray to us (at best) and our inclination is to want to make them black or white. People look for scapegoats, and the awesome computer is a convenient one. What is sad is that it has become a scapegoat in certain segments of the scholarly community, including people with the ability to apply the computer to humanitarian ends. The computer's potential for good is vast, but it is like an empty tablet that must be filled in by man to be made useful and meaningful. To fill it in well requires understanding, and the bias that underlies scapegoating is the enemy of understanding. In the last analysis, the question with which we started (the computer--hero or villain) is a question about men, not machines. We can look to ourselves in answering.
AD-657 812 Not available from CFSTI.

IMPROVEMENT OF HANDLING CHARACTERISTICS OF THE VEHICLE AS A MAN-MACHINE SYSTEM.
Tokyo Univ. (Japan). Inst. of Industrial Science.
O. Hirao, E. Kikuchi, and N. Yamada. May 67, 29p
Its Vol. 17, No. 7, Ser. 114

Descriptors: *Handling quality, *Human performance, *Man-machine system, *Steering, Automobile, Characteristics, Handling, Human, Man-machine, Performance, Quality, System, Vehicle.

For abstract, see STAR 05 20.
N67-35176 HC$3.00 MF$0.65

5I. Personnel Selection, Training, and Evaluation

REVIEW OF THE CHINESE COMMUNIST ARMY IN ACTION: THE KOREAN WAR AND ITS AFTERMATH; THE CHINESE PEOPLE'S LIBERATION ARMY,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15G.
AD-657 753 Not available from CFSTI.

MOVE THE INFORMATION, A KIND OF MISSIONARY SPIRIT,
Air Force Office of Scientific Research Arlington Va Directorate of Information Sciences
For primary bibliographic entry see Field 5B.
AD-657 794 HC$3.00 MF$0.65

CYBERNETICS AND EDUCATION,
System Research Ltd Richmond (England)
Gordon Pask. Aug 67, 17p
AFOSR-67-2001
Contract F61052-67-C-0010
Presented at the Congress of the International Association of Cybernetics (5th), Namur (Belgium), Sep 67.

Descriptors: (*Cybernetics, Teaching methods), (*Teaching machines, Computers), Learning, Adaptive systems, Psychology, Education, Input-output devices, Performance (Human), Control systems.
Identifiers: Computer-aided instruction.

This paper reviews the main contribution of cybernetics to the art and science of teaching. It reviews the bearing of cybernetic principles on teaching methods, and considers teaching as the control of learning. It describes the difference between sequential and skill teaching machines and the value of computer assistance in teaching machines. Adapative machines and adaptive metasystems are briefly discussed. (Author)
AD-657 806 HC$3.00 MF$0.65

PARKINSON'S LAW AS A GOAL-SETTING PHENOMENON,
American Institutes for Research Silver Spring Md
For primary bibliographic entry see Field 5J.
AD-657 893 Not available from CFSTI.

A PERSONNEL COST DATA BANK FOR USE IN STUDIES OF COST AND EFFECTIVENESS.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5A.
AD-657 941 HC$3.00 MF$0.65

TRAINING 90 MM AA GUN CREWS. APPENDIX IV. TRAINING AIDS AND DEVICES.
Technical rept.,
Ohio State Univ Research Foundation Columbus
John E. Horrocks, Donald Bowlus, and Robert

E. Krug. 1953, 125p
SPECDEVCEN-495-01-4
Contract Nonr-495 (01)
See also Appendix 3 - AD-642 589; Appendix 5 - AD-642 590.

Descriptors: (*Antiaircraft gunnery, Training devices), (*Gunnery trainers, *Human engineering), Teaching methods, Instruction manuals, Training.

The appendix on the training of 90 MM AA gun crews contains a description of training aids and devices previously developed and recommended by the subject project.
AD-657 947 HC$3.00 MF$0.65

AVIATOR CAPABILITY VS WORKLOAD.
Army Aviation School Fort Rucker Ala
1959, 3p
Availability: Published in U. S. Army Aviation Digest May 1959.

Descriptors: (*Pilots, Performance (Human)), Aviation safety, Human engineering, Stress (Psychology), Fatigue (Physiology), Training.

Diagrams are presented which graphically illustrate the varying margins of safety between an aviator's capability and the workload imposed during all phases of flight.
AD-657 998 Not available from CFSTI.

A SUPPLY FUNCTION OF FIRST-TERM REENLISTEES TO THE AIR FORCE,
Rand Corp Santa Monica Calif
John McCall, and Neil Wallace. Sep 67, 26p Rept no. P-3653

Descriptors: (*Military personnel, *Personnel management), (*Air Force personnel, *Wages), Manpower, Job analysis, Training, Technicians, Attitudes, Education, Recruiting.

This study has investigated the first-term reenlistment behavior of Air Force airmen, in particular, electronic specialists. Primary attention has been given to drawing inferences about the responsiveness of the reenlistment rate to changes in Air Force remuneration. The reenlistment rate was found to be quite sensitive to differences in estimated potential civilian earnings among the airmen. This implies an elasticity of supply of first-term airmen with respect to annual Air Force remuneration equal to about four. This study can be extended in several directions. Analysis of the temporal behavior of the supply of reenlistees is the most obvious. This would require the collection of time series data on the earnings of ex-airmen. We expect these earnings to depend upon the general state of the economy, the economic health of those industries in which Air Force training is likely to be used, and on the characteristics of the airmen themselves--on the biographical variables we've examined and on skill level attained in the Air Force. The relationship between earnings and these variables together with the supply function estimated in this paper could be used to predict the supply of reenlistees over time, and, in addition, would provide further tests of the supply function.
AD-658 008 HC$3.00 MF$0.65

THE VIETNAMESE REFUGEE COMMUNITIES IN NORTHEAST THAILAND,
Joint Research and Test Activity San Francisco Calif 96243
Peter A. Poole. Dec 66, 38p
Availability: Published in PACIFIC AFFAIRS, University of British Columbia, Vancouver, in 1967.

Descriptors: (*Refugees, Vietnam), (*Foreign policy, Thailand), Communists, Insurgency, Propaganda, Police, Population, Motivation, Control, Government (Foreign), Education, Religion, Economics, Decision making, Language.

To summarize this brief description of the Vietnamese refugee communities, the total Vietnamese population in the Northeast has been estimated at about twice the number still on the register awaiting repatriation. The Government's control measures have impeded subversive activity on the part of the refugees, but the Thai authorities do not claim to have eliminated the Vietnamese Communist organization. The latter organization influences a far greater number of the refugees than do the South Vietnamese information officers. The Vietnamese refugees have made a substantial contribution to the economic development of Northeast Thailand, but they have not in any sense been assimilated. Intermarriage between Thais and Vietnamese is still quite rare. Many more Vietnamese children attend Thai and Catholic schools, and speak Thai as their first language, than in the past; but these children also attend classes organized by the Vietnamese Communists. Only a fraction of the Roman Catholics among the refugees are thought to be anti-Communist. Thus, it is clear, as the Minister of Interior has often pointed out in his press conferences, that the Vietnamese refugees in Northeast Thailand are a potentially dangerous target of Communist subversion.
AD-658 283 Not available from CFSTI.

A PERFORMANCE-ORIENTED ELECTRONICS TECHNICIAN TRAINING PROGRAM. III. COURSE EVALUATION INSTRUMENTS AND PROCEDURES.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5J.
AD-658 316 HC$3.00 MF$0.65

INITIAL DEVELOPMENT AND EVALUATION OF A BASIC ELECTRONICS ASSEMBLY TEST (BEAT).
Research memo.,
Naval Personnel Research Activity San Diego Calif
John H. Steinemann. Jul 67, 20p Rept no. NPRA-SRM-68-1

Descriptors: (*Electronic technicians, Selection), (*Performance tests, Electronic technicians), Naval training, Naval personnel, Test construction (Psychology), Achievement tests, Correlation techniques.

The Basic Electronics Assembly Test (BEAT) was developed as an approach to the requirement for a measure of basic skills in the area of electronics technician performance. BEAT is a portable instrument with face validity as a measure of basic electronics skills since it involves a sampling of realistic assembly tasks and standard electronics components. BEAT was administered as part of a pre-training inventory to five successive trainee classes of the experimental courses for Electronics Technicians (X-ET) conducted by the Navy Training Research Laboratory, San Diego, 1964-1966. Correlations were computed between BEAT scores and performance achievement in the X-ET course. BEAT Time score was significantly correlated with achievement in the Fundamentals Phase of the X-ET course. There are indications that an instrument such as BEAT, by providing diagnostic evaluations of practical performance abilities, may prove a useful supplement to available verbal test information. (Author)
AD-658 317 HC$3.00 MF$0.65

TRAINING FEEDBACK IN ELECTRONICS MAINTENANCE.
Research rept.,
Naval Personnel Research Activity San Diego Calif
Chester R. Bilinski, John C. Saylor, and Lloyd S. Standlee. Aug 67, 33p Rept no. NPRA-SRR-68-2

Descriptors: (*Naval personnel, *Naval training), (*Electronics, *Maintenance), Job analysis, Interference, Technicians, Electronic equipment, Shipborne, Feedback, Supervisory personnel, Attitudes.

A survey was made of fleet-to-school training feedback in electronics maintenance. The survey was conducted aboard 35 ships and 8 shore activities in the San Diego area. At present there seems to be only sporadic feedback of electronics maintenance information from the fleet back to the schools responsible for training electronics technicians. Most existing electronics maintenance data gathering forms tend to be administrative or hardware rather than training oriented, and to be used for purposes other than improving training curricula. Fleet personnel expressed a willingness to provide training feedback data, but they also expressed a desire for minimum interference with on-the-job maintenance duties. Fleet technicians have considerable difficulty in maintaining the MK 10 IFF system. Many of the difficulties appear to result from a lack of understanding of the overall interrelation and functions of the separate electronic equipments that make up the MK 10 IFF system, and from inability to set up and properly use the special equipment (AN/UPM-70 or AN/UPM-99) that is required for testing the system. The structured interview technique, when based upon a thorough job analysis, appears to be a highly satisfactory way of providing fleet-to-school training feedback. (Author)
AD-658 319 HC$3.00 MF$0.65

THE SIGNIFICANCE OF ROLE BEHAVIOR DIFFERENTIATION FOR CROSS-CULTURAL INTERACTION TRAINING.
Illinois Univ Urbana Group Effectiveness Research Lab
For primary bibliographic entry see Field 5K.
AD-658 410 Not available from CFSTI.

SPELLING DRILLS USING A COMPUTER-ASSISTED INSTRUCTIONAL SYSTEM.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
J. M. Knutson. 30 Jun 67, 81p NASA-CR-87482, TR-112
Contract NGR-05-020-036

Descriptors: *Computer method, *Learning, *Mental performance, *Teaching machine, Computer, Confidence, Digital, Drill, Error, Estimate, Instruction, Machine, Mental, Method, Performance, Practice, Repetition, Response, Student, Teaching.

For abstract, see STAR 05 20.
N67-34432 HC$3.00 MF$0.65

A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING A NATIONAL PROGRAM FOR TRAINING SKILLED AVIATION PERSONNEL,
Arizona State Univ., Tempe.
Walter E. Burdette, and Victor E. Rothe. Jul 67, 348p

Descriptors: (*Aviation personnel, *Training), (*Civil aviation, Training), Feasibility studies, Flight crews, Maintenance personnel, Pilots.

The employment of civil air carrier aircraft cockpit crew members will increase from 22,972 in 1965 to 43,665 in 1980, with a total cumulative requirement of 35,906 new pilots for that period. The civil air carrier mechanic work force will increase from 43,667 in 1965 to 80,224 in 1980, with a total cumulative requirement of 95,392 new mechanics for that period. The general aviation fleet will increase from 104,000 to 315,000 units, with total flight hours increasing from 16.7 to 63 million

flight hours per year by 1980. Commercial pilot requirements in general aviation will increase from 48,760 in 1965 to 184,750 in 1980, with a total cumulative requirement for 182,075 pilots for that period. The number of mechanics in general aviation will increase from 40,000 in 1965 to 120,000 in 1980, with a total cumulative requirement for 138,483 new mechanics during that period (approximately one-third would be certificated). (Author)
PB-175 728 HC$3.00 MF$0.65

FEDERALLY FUNDED MANPOWER DEVELOPMENT PROGRAMS IN PHILADELPHIA: AN EVALUATION,
Philadelphia, Pa. Economic Development Unit.
Norma W. Carlson, and Patricia L. Mallory. Jul 67, 66p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Employment, *Manpower studies), Labor, Education, Pennsylvania, Training, Costs, Motivation.
Identifiers: Philadelphia, Evaluation, Manpower development programs.

Since 1963, Philadelphia has intensified and expanded training and related services for the unemployed and underemployed in the City using Federal funds available under the MDTA and other acts. No current in-depth analysis of the total manpower development programs in the City exists. Therefore, the Economic Development Unit began a study in October, 1966, covering the period September, 1963, to the end of October, 1966, to evaluate the effectiveness of the programs in terms of total persons served and adequacy of services relative to need. The findings are: (1) A broad scope of services is provided by the programs but these services are not meeting the needs of all groups. (2) Immediate placement in a job ranks as the primary service. (3) Training programs have enrolled relatively more prime-age workers (22-39) and women than other client groups, evidenced by a participation rate of over 50 percent for the first group and a rate of nearly 50 percent for the latter. (4) Estimated aggregate expenditures of about $14 million for the thirty-eight-month period are high, partly because per capita cost for institutional training is about three times that for on-the-job training and institutional graduates outnumber on-the-job graduates by about four to one. Requirements and recommendations for a more effective program are given.
PB-175 790 HC$3.00 MF$0.65

5J. Psychology (Individual and Group Behavior)

A LONGITUDINAL STUDY OF LIFE-CHANGE AND ILLNESS PATTERNS,
Navy Medical Neuropsychiatric Research Unit San Diego Calif
For primary bibliographic entry see Field 6E.
AD-657 550 Not available from CFSTI.

BIOGRAPHICAL PREDICTORS OF PERFORMANCE IN AN EXTREME ENVIRONMENT,
Navy Medical Neuropsychiatric Research Unit San Diego Calif
E. K. Eric Gunderson, and Paul D. Nelson. 23 Aug 65, 12p Rept no. 65-7
Availability: Published in The Journal of Psychology v61 p59-67 1965.

Descriptors: (*Confined environments, *Adjustment (Psychology)), Naval personnel, Antarctic regions, Military psychology, Selection, Questionnaires, Sociometrics, Performance (Human), Predictions.

Relationships were assessed between biographical data and performance evaluations for Navy participants in the United States Antarctic Research Program. Prior to deployment to Antarctica, 425 Navy men completed a biographical questionnaire eliciting information concerning military record, interests and hobbies, family and educational background, and vocational experience. After approximately one year at an Antarctic scientific station, performance evaluations were obtained from station supervisors and peers. Results from earlier samples (predominantly from large stations) indicated that age, rank, years of naval experience, marital status, worship, delinquency, and amount of reading were significantly related to peer evaluations of adjustment. Results from small-station groups, analyzed in the present study, reveal important differences in the attributes that are correlated with performance criteria. (Author)
AD-657 553 Not available from CFSTI.

IMPACT OF FEEDBACK ON ACCURACY OF CONFIDENCE LEVELS ASSIGNED BY INTERPRETERS.
Technical research note,
Army Behavioral Science Research Lab Washington D C
James A. Thomas, and Robert Sadacca. Jun 67, 27p Rept no. BESRL-TRN-187

Descriptors: (*Photointerpretation, *Psychometrics), (*Photointerpreters, Attitudes), Feedback, Computers, Simulation, Photographic intelligence, Targets, Identification, Performance (Human).
Identifiers: Confidence (Psychology).

The study dealt with the utility of feedback presented under simulated computerized conditions in improving the performance of interpreters in judging the value of their own identifications. Results supported previous findings that interpreters do not as a rule make dependable evaluations of their identifications. Confidence ratings made by interpreters in the high performance subgroup were generally more accurate and complete than those made in the low performance subgroup. Two feedback techniques in which the interpreters were given only data on previous rating performance--their own and their own plus that of other classes--resulted in somewhat more accurate expressions of confidence than did the technique in which interpreters were given their own corrected reports and the imagery they had previously interpreted. Confidence ratings reported by the interpreter group receiving no feedback were the least precise. It was concluded that interpreters' confidence ratings can be improved by practice in applying a knowledge-of-results frame of reference. Findings suggest, however, that more than two practice sessions are needed for the interpreter to reach an operationally useful level of accuracy in evaluating the information he provides. (Author)
AD-657 583 HC$3.00 MF$0.65

COMMUNICATION IMPACT: A CONCEPTUAL MODEL ANALYSIS OF INDIVIDUAL PREDISPOSITIONS AND THE IMPACT OF A COUNTY CIVIL DEFENSE EDUCATIONAL PROGRAM.
Iowa State Univ Ames Dept of Sociology and Anthropology
For primary bibliographic entry see Field 15C.
AD-657 598 HC$3.00 MF$0.65

THE EFFECTS OF SIZE AND BRIGHTNESS ON THE SPEED OF IDENTIFYING NUMBER OF RANGE RINGS.
Technical rept.,
Johns Hopkins Univ Baltimore Md Psychological Lab
I. J. Saltzman, and W. R. Garner. 20 Jan 49, 14p
SPECDEVCEN-166-1-79
Contract N5ori-166 (01)

Descriptors: (*Display systems, *Visual perception), Brightness, Performance (Human), Visibility, Human engineering, Identification, Range finding, Rings.

There is an optimal display size for identifying the total number of range rings. The effect of size is not pronounced, however, except at small visual angles. In general, it seems best to use visual angles between 20 and 60 degrees. The effect of visual angle is much more severe with large total numbers than with small total numbers. For example, changing the visual angle from 28 degrees to approximately 3.5 degrees increases identification time almost by a factor of two when 10 rings are used. A similar change in visual angle for two rings increases identification time less than 10 per cent. There is a suggestion that, at a constant visual angle, identification time is faster with a larger diameter display with the observer farther away than with a smaller diameter display with the observer closer. The optimum screen brightness is approximately 10 apparent foot candles, although the effect of brightness is small over a wide range of brightnesses. The effect of increasing the total number of rings is much more severe than any of the effects due to differences in size or brightness, except when very small visual angles are used with large numbers of rings. Individual differences in speed of identification are large, and selection of observers for this type of perceptual task may be the best means of increasing efficiency. (Author)
AD-657 622 HC$3.00 MF$0.65

DISCRIMINATION OF SMALL TIME INTERVALS BETWEEN A VISUAL AND AN AUDITORY SIGNAL.
Technical rept.,
Johns Hopkins Univ Baltimore Md Psychological Lab
J. W. Gebhard, and R. M. Halsey. 1 Jan 49, 15p
SPECDEVCEN-166-1-60
Contract N5ori-166 (01)

Descriptors: (*Psychometrics, *Auditory signals), (*Visual signals, Psychometrics), Eye, Sensitivity, Ear, Detection, Auditory perception, Psychology, Tests.

A display of information which presents the same objective facts to the eyes and ears would be advantageous in certain radar situations. An important problem in the successful application of such a display is the sensitivity of individuals to auditory and visual signals separated by small time intervals. To study this, a series of experiments was performed to test the ability of individuals to detect the coincidence of stimuli presented to the eyes and ears at nearly the same time. An exploratory attempt to make an audio and a video signal coincide on a repeater PPI showed that blips could not be made small enough or separated accurately enough to test the limits of discrimination. Therefore, a special apparatus simulating a PPI type of presentation was constructed to allow accurate positioning of 1/32 inch dots ('targets') anywhere on a 12 inch display. A rotating pointer ('sweep') of variable speed passed the dots coincident with a click heard in the observer's earphones. (Author)
AD-657 623 HC$3.00 MF$0.65

DECISION MAKING AND PERFORMANCE IN HETEROGENEOUS AND HOMOGENEOUS GROUPS,
Princeton Univ N J Dept of Psychology
Paul Stager, and J. L. Kennedy. 12 Feb 65, 38p Rept no. 6
Contract Nonr-1858 (42)

Descriptors: (*Decision making, *Group dynamics), Performance (Human), Uncertainty, Game theory.
Identifiers: Information processing (Psychology).

Decision making in small heterogeneous and homogeneous groups was investigated from the standpoint of information acquisition, information processing, and group performance in a simulated business game. The task required extensive infor-

mation search, tracking of environmental change and integration of the information acquired. The groups were composed on the basis of the Ss' cognitive structure defined by a dimension of abstractness in conceptual complexity. Assessments of eight experimental groups were obtained for information acquisition, information processing and group performance. Although the more structurally concrete groups evidenced the most extensive information searching, assessment of group performance was highest for the heterogeneous abstract groups. The heterogeneous concrete groups were assessed more effective than the homogeneous concrete groups. The level of group heterogeneity appeared to be a determining factor in the influence which the overall level of conceptual complexity had on group performance. (Author)
AD-657 625 HC$3.00 MF$0.65

ANIMAL PSYCHOPHYSICS: AN EXAMINATION OF THE FIELD.
Technical rept.,
Washington Univ Seattle Psychophysics Lab
Carol A. Saslow. 1 Aug 67, 31p Rept no. PRP-37N
Contract Nonr-477 (34)

Descriptors: (*Animals, *Psychophysics), Sensory perception, Psychophysiology, Behavior, Thresholds (Physiology), Responses, Reaction (Psychology), Reflexes, Electrophysiology, State-of-the-art reviews.
Identifiers: Information processing (Psychology).

The essay critically describes the present state of the field of animal psychophysics. The field is divided into studies concerned with behavioral investigation of performance capabilities and studies primarily concerned with sensory physiology. The 'performance' category includes research on thresholds, response bias, and scaling. The 'physiology' category includes production of baseline behavior, correlation of physiological and psychological responses, and simultaneous measurements of physiological and psychophysical functions. The problems discussed include the assumption that performance measures are completely determined by sensory constraints; the pitfalls inherent in direct and indirect methods (including reaction time) of doing scaling work with animals; and the need for application of behavioral paradigms derived from contemporary psychophysics which would permit measurement of performance changes, following physiological maneuvers, in terms of alterations of sensory capabilities and response bias effects. (Author)
AD-657 626 HC$3.00 MF$0.65

COMMUNICATION, COOPERATION, AND NEGOTIATION IN CULTURALLY HETEROGENEOUS GROUPS.
Quarterly rept.,
Illinois Univ Urbana Group Effectiveness Research Lab
Fred E. Fiedler, Lawrence M. Stolurow, and Harry C. Triandis. 31 Jul 67, 20p
Contract Nonr-1834 (36), ARPA Order-454

Descriptors: (*Social psychology, *Culture), Behavior, Group dynamics, Leadership, Perception (Psychology), Attitudes, Programmed instruction, Performance (Human), Effectiveness.

The project seeks to identify culturally critical concepts and behaviors which are likely to affect interpersonal relations and task performance in culturally heterogeneous groups. Subproject I (Triandis) developed three techniques for identifying cultural differences in interpersonal behaviors: Role differential, behavioral differential, and semantic feature analysis. The techniques measure the ways individuals from different cultures perceive and interpret interpersonal behaviors. Subproject II (Stolurow) developed a programmed self-instructional training system (the Culture Assimilator), which has been utilized successfully in a number of laboratory and field investigations. Subproject III (Fiedler) continued work on a theory of leadership effectiveness (the Contingency Model), a theory which aids in the prediction of group and organizational performance and which provides a rationale for modifying the group structure, the task, and group composition to increase performance in heterocultural situations. (Author)
AD-657 630 HC$3.00 MF$0.65

DESCRIPTIONS OF FLYOVER NOISE SIGNALS PRODUCED BY VARIOUS JET TRANSPORT AIRCRAFT.
Bolt Beranek and Newman Inc Los Angeles Calif
For primary bibliographic entry see Field 20A.
AD-657 633 HC$3.00 MF$0.65

ORGANIZATIONAL COMMUNICATION: A BIBLIOGRAPHY,
Rutgers - the State Univ New Brunswick N J Graduate School of Library Service
Henry Voos. 1967, 257p
Contract Nonr-404 (21)
Availability: Published in Rutgers - the State University.

Descriptors: (*Social communication, Bibliographies), Organizations, Group dynamics, Military organizations, Semantics, Verbal behavior, Management engineering.

The literature on group communication was surveyed for the period 1958 to June 1966. The psychological and managerial literature shows that communication is of prime concern to both the military and commercial establishments. Solutions for the future seem to point to the application of the laboratory techniques used in testing communication flow to real situations. Excluded from this search has been the literature on electronic communication techniques, family and student groups, and the communication of technical information. (Author)
AD-657 647 Not available from CFSTI.

DISCRIMINABILITY OF STIMULI VARYING IN PHYSICAL AND RETINAL ORIENTATION,
Oregon Univ Eugene
Fred Attneave, and Richard K. Olson. 1 Jul 66, 11p
AFOSR-67-2007
Grant AF-AFOSR-973-66
Availability: Published in Journal of Experimental Psychology v74 n2 pt1 p149-57 1967.

Descriptors: (*Visual perception, Geometric forms), Retina, Posture, Performance (Human), Learning, Target discrimination, Reaction (Psychology), Reflexes.

In two discrimination reaction-time experiments, adult human Ss responded faster to horizontal and vertical stimuli (lines or rectangles) than to stimuli tilted 45 degrees right and left. When S viewed the stimuli with his head tilted 45 degrees, so that physical and retinal orientation were in opposition, it was on the physical rather than the retinal horizontals and verticals that performance was superior. In another experiment head position was changed 45 degrees after a period of learning. Ss required to give the same responses to the same physical orientations did much better on the transfer task than those required to give the same responses to the same retinal orientations. The latter were not significantly superior to a pure transposition group for whom the S-R relationships were shifted both physically and retinally. (Author)
AD-657 649 Not available from CFSTI.

PERCEPTION AND JUDGMENT IN THE POLITICAL EXTREMIST,
Gustavus Adolphus Coll St Peter Minn
James O. Whittaker. 1967, 10p
AFOSR-67-2008
Grant AF-AFOSR-62-188
Availability: Published in The Journal of Communication v17 n2 p136-41 Jun 1967.

Descriptors: (*Perception (Psychology), *Attitudes), (*Behavior, Predictions), Acceptability, Political science, Social communication, Public opinion, Experimental data, Social psychology, Group dynamics.

Recent studies of perception and judgment have suggested that for purposes of prediction, an attitude is better regarded in terms of a range of tolerance for positions on an issue rather than a point. As opinion on any issue becomes more extreme, tolerance for deviating positions decreases. Thus the political extremist tends to dichotomize in his thinking - 'you're either for us or against us'. He does not discriminate 'shades of grey' on an issue.
AD-657 662 Not available from CFSTI.

THE EFFECTIVENESS OF ADJUSTMENT BY SUBCLASSIFICATION IN REMOVING BIAS IN OBSERVATIONAL STUDIES.
Technical rept.,
Harvard Univ Cambridge Mass Dept of Statistics
W. G. Cochran. 8 Aug 67, 31p Rept no. TR-18
Contract Nonr-1866 (37)

Descriptors: (*Psychometrics, Statistical analysis), Performance (Human), Probability, Mathematical models, Sampling, Regression analysis, Stochastic processes.

In some investigations, comparison of the means of a variate y in two study groups may be biased because y is related to a variable x whose distribution differs in the two groups. A frequently used device for trying to remove this bias is adjustment by subclassification. The range of x is divided into c subclasses. Weighted means of the subclass means of y are compared, using the same weights for each study group. The effectiveness of this procedure in removing bias depends on several factors, but for monotonic relations between y and x, an analytical approach suggests that for $c = 2, 3, 4, 5$, and 6 the percentages of bias removed are roughly 64%, 79%, 86%, 90%, and 92%, respectively. The extent to which adjustment reduces the sampling error of the estimated difference between the y means is examined. Under a simple mathematical model, errors of measurement in x reduce the amount of bias removed to a fraction $1/(1+h)$ of its value, where h is the ratio of the variance of the errors of measurement to the variance of the correct measurements.
AD-657 849 HC$3.00 MF$0.65

CONCEPTUAL LEVEL AS A COMPOSITION VARIABLE IN SMALL GROUP DECISION-MAKING.
Technical rept.,
Princeton Univ N J Dept of Psychology
Paul Stager. Feb 66, 88p Rept no. TR-17
Contracts Nonr-1858 (12), Nonr-1858 (42)

Descriptors: (*Decision making, *Group dynamics), (*Perception (Psychology), *Behavior), Psychometrics, Selection, Environment, Performance (Human), Interactions, Personality, Determinants, Problem solving.

Decision-making in small groups, varying in composition along a dimension of conceptual level, was investigated from the standpoint of the emergent functional role structure, conflict generation, utilization of conflict in decision synthesis, and information acquisition. The study was directed toward an understanding of the relationship between the conceptual level dimension (the independent variable) and the dependent variables of group information processing structure and specific predecisional processes. On the basis of the conceptual systems theory, the following hypotheses were advanced: (a) structuring decreases or, conversely, role flexibility increases, as the per-

centage of members of a high conceptual level in the group increases; (b) groups, in which the members are all of a high conceptual level, manifest more interpersonal conflict than groups in which the members differ in conceptual; (c) the extent to which generated conflict is utilized in decision synthesis increases with an increasing PMHCL in the group: (d) the extent of search for novel information increases as the PMHCL in the group increases, whereas total information search is not dependent upon group composition. Each of the hypotheses advanced was confirmed by the obtained results. (Author)
AD-657 850 HC$3.00 MF$0.65

PROJECT ARGUS 1967: FIVE YEAR REVIEW AND PREVIEW.
Research rept.,
Naval Medical Research Inst Bethesda Md
William W. Haythorn. Aug 67, 60p
NAVMED-MF-022.01.03-1002-31

Descriptors: (*Confinement (Psychology), Reviews), Group dynamics, Stress (Psychology), Social psychology, Ecology, Behavior, Training, Confined environments, Adjustment (Psychology), Personality, Performance (Human), Sensory deprivation, Emotions, Morale.
Identifiers: Sealab project, Argus project.

The report summarizes research progress under Project ARGUS for the period October 1965 to June 1967, and presents research plans for the five years 1968 - 1972. The accomplished research reported includes work on groups in isolation, social penetration, ecological aspects of behavior, sensory reduction, affect measurement, comparative monotony, activity measures, social comparison processes, behavioral contagion, Project SEALAB, expectancy confirmation, and stress. The report summarizes research described in more detail in 55 journal articles, chapters, and presentations to professional societies. The project plans for the next five years envision continuing efforts in most of the above areas, with an increased emphasis on training, computer modelling, and larger isolated groups. (Author)
AD-657 862 HC$3.00 MF$0.65

MENTAL TEST THEORY. VOLUME I. THE FOUNDATIONS OF MENTAL MEASUREMENT THEORY.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 30 Jun 67, 103p
Contract Nonr-4866 (00)
See also Volume 6, AD-657 875.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Education.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume I contains the following two chapters: Measurement in psychology and education, and the construction of true and error scores.
AD-657 868 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME II. THE CLASSICAL TEST THEORY MODEL. SECTION 1.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 30 Jun 67, 134p
Contracts Nonr-4866 (00), Nonr-2752 (00)
See also Volume 1, AD-657 868.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human).

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume II, section 1 contains chapters 3, 4, and 5, titled respectively: Basic equations of the classical model for tests of fixed length; Composite tests; and Basic equations of the classical model for homogeneous tests of variable length.
AD-657 869 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME II. THE CLASSICAL TEST THEORY MODEL. SECTION 2.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 30 Jun 67, 79p
Contracts Nonr-4866 (00), Nonr-2752 (00)
See also Volume 2, Section 1, AD-657 869.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Reliability.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume II, section 2 contains chapters 6 and 7, titled respectively: Factors affecting measurement precision, estimation and prediction; and Some estimates of parameters of the classical model.
AD-657 870 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME III. OTHER WEAK TRUE-SCORE MODELS.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 1 May 67, 160p
Contracts Nonr-4866 (00), Nonr-2752 (00)
See also Volume 2, Section 2, AD-657 870.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Reliability, Sampling.
Identifiers: Maximum likelihood.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume III contains chapters 8 through 11, titled respectively: Some test theory for imperfectly parallel measurements; Types of reliability coefficients and their estimation; Some test theory for essentially tau-equivalent measurements, including estimation of higher-order moments; and Item sampling in test theory and in research design.
AD-657 871 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME IV. VALIDITY AND TEST CONSTRUCTION THEORY. SECTION 1.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 1 May 67, 122p
Contract Nonr-4866 (00)
See also Volume 3, AD-657 871.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Predictions, Sampling, Reliability.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Section 1 of Volume IV contains chapters 12 through 14, titled respectively: Validity; The selection of predictor variables; Measurement procedures and item-scoring formulas.
AD-657 872 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME IV. VALIDITY AND TEST CONSTRUCTION THEORY. SECTION 2.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 30 Jun 67, 129p
Contracts Conr-4866 (00), Nonr-2752 (00)
See also Volume 4, Section 1, AD-657 872.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Sampling, Behavior.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Section 2 of Volume IV contains Chapters 15 and 16, titled respectively: Item parameters and test construction; Latent traits and item characteristic functions.
AD-657 873 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME V. SOME LATENT TRAIT MODELS AND THEIR USE IN INFERRING AN EXAMINEE'S ABILITY.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, Melvin R. Novice, and Allan Birnbaum. 30 Jun 67, 146p
Contract Nonr-4866 (00)
See also Volume 4 Section 2, AD-657 873.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Aptitude tests.
Identifiers: Maximum likelihood.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume V contains Chapters 17, 18, and 19, titled respectively: Some latent trait models; Test scores, sufficient statistics, and the information structures of tests; Classification by ability levels.
AD-657 874 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME VI. STRONG TRUE-SCORE THEORY.
4th ed.,
Educational Testing Service Princeton N J
Frederic M. Lord, and Melvin R. Novick. 30 Jun 67, 126p
Contracts Nonr-4866 (00), Nonr-2752 (00)
See also Volume 5, AD-657 874.
Availability: Published in Copyrighted journal.

Descriptors: (*Psychometrics, Statistical analysis), Intelligence tests, Mathematical models, Psychology, Performance (Human), Statistical processes, Stochastic processes, Probability.

This report is an up-to-date, comprehensive, mathematical statistical presentation of mental test theory and its applications. Volume VI contains chapters 21 through 24, titled respectively Poisson process models; Measurements with independent errors of known distributional form; Binomial error models; True scores, factors and latent traits.
AD-657 875 Not available from CFSTI.

PARKINSON'S LAW AS A GOAL-SETTING PHENOMENON,
American Institutes for Research Silver Spring Md
Judith F. Bryan, and Edwin A. Locke. 1967, 19p
Contract Nonr-4792 (00)

Availability: Published in Organizational Behavior and Human Performance v2 n3 p258-75 1967.

Descriptors: (*Time studies, *Adjustment (Psychology)), (*Performance (Human), Attitudes), Perception (Psychology), Behavior, Reaction (Psychology), Group dynamics, Psychometrics, Errors, Standards, Efficiency.

Two experiments were designed to test the effects of different time limits on time taken to complete a task (Parkinson's law) and to determine whether goal-setting mediated the effects of time limits on performance rate. It was hypothesized that the different time limits would produce differences in performance rate only if and to the degree that different goals were set by Ss in the different conditions. Two groups were run in each experiment. On the first three trials, the Excess-time Ss were given twice as much time as was needed to complete an addition task, and the Minimum-time Ss were given just enough time to finish it. On the fourth trial, the Ss in both groups were allowed to work at their own pace, and on the fifth trial the Ss in both groups were asked to work as fast as their estimated 'fastest possible' time. Both groups in both experiments performed in accordance with Parkinson's Law on trials 1 to 3 (the Excess Ss taking longer to complete the task), and the hypothesis that goal setting mediated the Parkinson effect was supported. It was also found, however, that the same goal could mean different things in different contexts. For instance, the Ss in the Excess group who were trying to work 'quickly but not as fast as possible' on trials 1 to 3 worked at a significantly slower pace on these trials than the Minimum Ss who said they were working for the same goal during this period. Although the Parkinson effect did not extend to trials 4 and 5, goals were related to performance within groups on these trials.

AD-657 893 Not available from CFSTI.

FACTORS IN RECOVERY FROM PERFORMANCE DECREMENT: ACTIVATION, INHIBITION AND WARM-UP,

Naval Training Device Center Orlando Fla
John F. Catalano, and Patricia M. Whalen. 22 May 67, 10p Rept no. NAVTRADEVCEN-IH-72
Availability: Published in Perceptual and Motor Skills v24 p1223-31 1967.

Descriptors: (*Tracking, Performance (Human)), Motor reactions, Inhibition, Stimulation, Muscles.

It has been recently found that rotary pursuit tracking performance can be enhanced as a result of inducing muscular tension by requiring individuals to squeeze a dynamometer as an interpolated activity between tracking trials. The present experiment was designed to determine whether such enhancement would result if the tension inducing activity utilized the same muscular movements as those involved in the rotary pursuit task. In the main condition, Ss were required to overcome 3 in.-lb. of resistance in order to turn a disk at 60 rpm. This interpolated activity significantly enhanced reminiscence beyond that following rest alone. No enhancement occurred in a control condition when there was no resistance to overcome. Another condition in which muscular tension was induced by turning the disk in a direction opposite to that of the pursuit rotor target resulted in an enhancement of reminiscence. A final tension inducing condition in which the disk was turned with the non-tracking hand produced a bilateral enhancement effect. It was generally found that those individuals with the greatest amount of performance decrement tended to show the greatest enhancement. The results of this study were viewed as additional evidence of the influence of changes in activation level upon efficiency of performance. (Author)

AD-657 896 Not available from CFSTI.

FEAR AND THE MODIFICATION OF ACOUSTICALLY EVOKED POTENTIALS DURING CONDITIONING,

Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Robert D. Hall, and Roger G. Mark. 8 Dec 66, 18p
Contract DA-36-039-AMC-03200 (E), Grant NSF-GK-835
Research supported in part by PHS, and NASA.
Availability: Published in J. Neurophysiol v30 p893-910 1967.

Descriptors: (*Conditioned reflex, *Fear), Reaction (Psychology), Anxiety, Behavior, Emotions, Responses, Auditory signals, Appetite, Electrophysiology, Motivation, Rats.

Several experiments were performed to determine if movement-related variables were responsible for previously observed changes in acoustically evoked potentials in the rat during aversive conditioning. In one experiment potentials were evoked in auditory cortex (AC), inferior colliculus (IC), and lateral lemniscus (LL) by electric stimuli applied within the cochlea or to ventral cochlear nucleus (VCN). Such stimulation bypassed peripheral auditory mechanisms operative during movement. Systematic increases were found in potentials from all three sites as an emotional response (CER) was established with a photic conditional stimulus (CS), and amplitudes of some components of these responses were directly related to strength of the CER. In one attempt to equate amounts of movement under appetitive control and aversive conditioning procedures, rats were trained to bar-press at equal rates under appetitive and aversive components of a multiple schedule of reinforcement. Equalization of bar-pressing rates did not eliminate differences in movement, but click-evoked potentials were found to be larger when rats worked to avoid shock than they were when the animals worked for food reinforcements. In another experiment a modified CER situation was employed in which partially restrained rats were trained to sit still during control periods, so that the characteristic 'freezing' during photic CS presentations did not represent a large reduction in amount of movement. A control for residual differences in amount of movement was accomplished by selectively sampling click-evoked potentials only when rats were motionless under both conditions. (Author)

AD-657 908 Not available from CFSTI.

ACOUSTICALLY EVOKED POTENTIALS IN THE RAT DURING CONDITIONING,

Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Roger G. Mark, and Robert D. Hall. 8 Dec 66, 18p
Contract DA-36-039-AMC-03200 (E), Grant NSF-GK-835
Research supported in part by PHS, and NASA.
Availability: Published in J. Neurophysiol v30 p875-92 1967.

Descriptors: (*Conditioned reflex, Electrophysiology), Emotions, Responses, Auditory signals, Fear, Behavior.

Click-evoked potentials were recorded from several auditory structures and from mesencephalic reticular formation of rats as a conditioned emotional response (CER) was established. When the click stimulus was employed as conditional stimulus (CS), amplitudes of click-evoked potentials recorded from auditory cortex, medial geniculate body and reticular formation increased during conditioning, reverted to preconditioning levels during extinction, and increased again with reconditioning. These changes were found in both restrained and unrestrained subjects. Only changes in late components of the cortical and medial geniculate responses were systematically related to strength of the conditioned response. Amplitude increases in early components of cortical and medial geniculate responses and in evoked potentials recorded from ventral cochlear nucleus were frequently encountered, but they appeared to have no consistent relationships with the conditioned changes in behavior. Click-evoked potentials exhibited similar changes in amplitude when a CER was brought under control of a photic CS. We conclude that the observed changes in evoked potentials during aversive conditioning were not related to associative factors, acquired conditional or discriminative properties of the acoustic stimulus, but to some more general factor that is frequently correlated with the CER. (Author)

AD-657 913 Not available from CFSTI.

ONE-TRIAL LEARNING WITH CONTROL OF ITEM DIFFICULTY,

Washington Univ Seattle Psychophysics Lab
Salvatore A. Pizzuro, and John van Laer. 15 Jul 67, 20p Rept no. PRP-38N
Contract Nonr-477 (34)
Prepared in cooperation with Dunlap and Associates, Stamford, Conn., and Hunter Coll. of the City Univ. of New York.

Descriptors: (*Learning, Predictions), Performance (Human), Statistical tests, Probability, Selection, Training, Students, Control, Reaction (Psychology), Psychophysics.

Ratings of difficulty were obtained for each of 2500 letter-number pairs. The ratings were used to construct three pools of items: Homogeneous Easy, Homogeneous Difficult, and Heterogeneous. Rock's (1957) experiment was repeated thrice, once with each pool of rated items. Each replication used 30 Ss. The manipulation of rated item-difficulty permitted a direct attack on the widely discussed problem of item-selection in Rock's procedure. Notwithstanding the control of item-selection, the performance of Ss in the drop-out condition did not differ significantly from the performance of Ss that learned in the ordinary way, with repetition. The geometric distribution provided a good fit to the obtained distributions of waiting times to the first correct response to an item. This finding accords nicely with an all-or-none view on associative learning.

AD-657 933 HC$3.00 MF$0.65

ON THE 'JUST NOTICEABLE DEPARTURE' OF DATA FROM THEORY,

Washington Univ Seattle Psychophysics Lab
John van Laer. 15 Jul 67, 13p Rept no. PRP-36A
Contract DA-49-193-MD-2713
Prepared in cooperation with Hunter Coll. of the City of New York.

Descriptors: (*Psychometrics, *Statistical tests), Sampling, Probability, Mathematical models, Learning.

A lower bound on the noncentrality parameter of the chi-square test of goodness of fit is derived. The bound is a function of the average of absolute discrepancies between theoretical and true probabilities. This bound provides a method that estimates the correspondence between theory and data, and that nullifies, in part, Grant's strictures against traditional goodness-of-fit tests. The method also serves as a guide to planning an empirical evaluation of a quantitative theoretical model, when a chi-square test of goodness of fit is contemplated. (Author)

AD-657 934 HC$3.00 MF$0.65

CONCEPTUAL STRUCTURE AND INTERPERSONAL ATTRACTION.

Technical rept.,
Douglass Coll New Brunswick N J
Siegfried Streufert, Carl Castore, Susan Kliger, and Michael J. Driver. Aug 67, 31p Rept no. TR-4
Contract N00014-67-A-0015-0002
Prepared in cooperation with Purdue Univ., Lafayette, Ind.

Descriptors: (*Social psychology, Attitudes), Leadership, Factor analysis, Personality, Group dynamics, Sociometrics.

The social choices of subjects differing in complexity of conceptual structure were obtained for a number of hypothetical situations: (1) at a party, (2) under the leadership of, (3) leading, (4) in an academic task. Choices for each condition were factor analyzed. It was found that structural complexity accounts for one quarter to one third of the variance in social choices and that factor defined groups for each condition differ in complexity. It was further found that structurally complex persons generally make more choices than structurally simple persons. Further, the results serve to refute the position of Calhoun that patterns of interpersonal choice are due to random mathematical order. (Author)
AD-657 942 HC$3.00 MF$0.65

RATE OF SPEAKING: I. RELATIONSHIP BETWEEN ORIGINAL AND REPEATED PHRASES,
Kenyon Coll Gambier Ohio
For primary bibliographic entry see Field 17B.
AD-657 943 HC$3.00 MF$0.65

SOME EFFECTS OF THE COMMON COLD UPON SPEECH: PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES.
Kenyon Coll Gambier Ohio
For primary bibliographic entry see Field 17B.
AD-657 945 HC$3.00 MF$0.65

RATE OF SPEAKING: IV. EFFECTS OF THE MODE AND LEVEL OF TRANSMITTING MESSAGES UPON THE RELATIONSHIP BETWEEN THEIR DURATION AND THE DURATION OF THEIR REPETITION.
Kenyon Coll Gambier Ohio
For primary bibliographic entry see Field 17B.
AD-657 946 HC$3.00 MF$0.65

SELECTING A HAREM-AND OTHER APPLICATIONS OF THE POLICY-CAPTURING MODEL,
Personnel Research Lab Lackland AFB Tex
Raymond E. Christal. Mar 67, 18p Rept no. PRL-TR-67-1

Descriptors: (*Psychometrics, *Regression analysis), Mathematical models, Simulation, Job analysis, Performance (Human), Decision making, Air Force personnel.

This paper describes how a mathematical equation, derived with the fixed-X multiple linear regression model, can be used to define and implement the policy of an individual or rating board. The model, which has been discussed in previous papers, is described in easy-to-follow, non-technical language. Several applications of the model are presented. (Author)
AD-658 025 HC$3.00 MF$0.65

THE EXPERIMENTAL ANALYSIS OF AGGRESSION,
Western Michigan Univ Kalamazoo
Roger E. Ulrich. Sep 67, 71p
Contract N00014-67-A-0421-0001
Prepared for publication in Behavior Modification in Clinical Psychology 71p nd.

Descriptors: (*Behavior, Social psychology), Reaction (Psychology), Pain, Stimulation, Motivation, Sex hormones, Environment, Animals, Humans, Conditioned reflex, Culture, Group dynamics.
Identifiers: Aggression.

Aggression in the world today is discussed as a lawful, natural result of the conditions this world continues to impose upon man. It is contended that there are reasons for race riots and reasons for man's tendency to resort to bombs and bullets. It is believed that in order to have such behavior cease, we must alter the conditions of which it is a function. More than likely, much aggression results from a child's early training and also from the fact that large segments of the world's population are still being forced to live under conditions which can be characterized as painful. Although human aggression remains an extremely complex problem, the data resulting from the experimental analysis of animal aggression will allow not only a greater understanding of the phenomenon, but will perhaps provide some of the first real breakthroughs contributing to its effective control.
AD-658 164 HC$3.00 MF$0.65

THE EFFECT OF CONCEPTUAL COMPLEXITY AND GROUP DISCUSSION ON RISK-TAKING AND JUDGMENTAL BEHAVIOR,
Princeton Univ N J Dept of Psychology
Helmut Lamm. Jun 66, 91p Rept no. 11
Contract Nonr-1858 (12)

Descriptors: (*Probability, *Group dynamics), (*Decision making, *Behavior), Psychometrics, Accuracy, Problem solving, Reasoning, Personality, Intelligence tests, Learning, Analysis of variance, Theses.

Several recent studies have reported that individuals take higher risks as a result of group discussion. The measure used in most of the relevant research has been a Choice Dilemmas instrument, where S's risk-taking propensity is inferred from the minimum odds of success he would demand before recommending the risky alternative in various hypothetical choice situations. A purpose of the present study was to test one prevalent explanation of the risky shift phenomenon, according to which it is a process of responsibility diffusion that enables the group members to become more acceptant of the risk of failure. This interpretation would not predict a shift toward risk on the part of an individual isolated from (and unnoticed by) the group but witnessing its discussion. An additional aim of this study was to investigate the role of information processing as a source of differences in risk taking.
AD-658 187 HC$3.00 MF$0.65

INTERMODAL EFFECT UPON HAPTIC JUDGMENTS OF DISTANCE,
Bryn Mawr Coll Pa
Robert S. Davidon. Sep 67, 3p
AFOSR-67-2109
Grant AF-AFOSR-109-63
Availability: Published in Proceedings Annual Convention APA n75 p23-4 1967.

Descriptors: (*Vision, Psychophysics), Reaction (Psychology), Visual perception, Errors, Analysis of variance.

Visual bisection of an extent in the line of sight yields a power function with an exponent of 1.5 for distances within reach or S, as well as for greater ones. The exponent for corresponding haptic judgments is 1.1. With simultaneous observation in both modalities the visual function is obtained; there is less veridicality than with touch alone. Rather than simply to ascribe dominance to vision, an oculomotor determinant of the constant error has been hypothesized. In the present experiment, when controlled convergence on the unseen divider accompanies the haptic bisection the psychophysical function corresponds to that with vision. (Author)
AD-658 238 Not available from CFSTI.

A METHOD FOR ESTRICTING STIMULI TO THE FRONTAL OR LATERAL VISUAL FIELD OF EACH EYE SEPARATELY IN PIGEON,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
For primary bibliographic entry see Field 6C.
AD-658 279 Not available from CFSTI.

INTER-HEMISPHERIC COMPARISON OF VISUAL STIMULI IN THE PIGEON,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
For primary bibliographic entry see Field 6C.
AD-658 280 Not available from CFSTI.

COMPARATIVE PRONOUNCEABILITY RATINGS (p) OF 100 CVCs IN TWO COLLEGE POPULATIONS,
Georgia Univ Athens
Clyde E. Noble. Sep 67, 4p
AFOSR-67-2133
Contract Nonr-3677 (02), Grant AF-AFOSR-1099-66
Availability: Published in Psychon Sci v8 n10 p433-4 1967.

Descriptors: (*Verbal behavior, Statistical analysis), Correlation techniques, Population.

A sample of 100 CVCs was presented to 200 Ss from widely-separated college populations at the Universities of Georgia and Montana in order to obtain comparative ratings of pronounceability (p). The results indicated high within-population reliability coefficient ($r > or = .98$) and a high between-population correlation coefficient ($r = .975$). When the ratings were grouped by fives into 20 pairs of means, the Montana norms regressed linearly on the Georgia norms with $r = .993$. (Author)
AD-658 282 Not available from CFSTI.

NEURALE MECHANISMEN EMOTIONALEN VERHALTENS (Neural Mechanisms of Emotional Behavior),
Milan Univ (Italy) Istituto Di Patologia Medica
For primary bibliographic entry see Field 6P.
AD-658 299 Not available from CFSTI.

ROLE DU THALAMUS MEDIAN DANS L'ETABLISSEMENT ET LA RETENTION DE CONDITIONNEMENTS DEFENSIFS, CLASSIQUES ET INSTRUMENTAUX (The Role of the Thalamus Median in the Establishment and the Retention of Conditioned Defenses, Classical and Instrumental),
Ohio State Univ Columbus Electroscience Lab
For primary bibliographic entry see Field 6P.
AD-658 305 Not available from CFSTI.

A PERFORMANCE-ORIENTED ELECTRONICS TECHNICIAN TRAINING PROGRAM. III. COURSE EVALUATION INSTRUMENTS AND PROCEDURES.
Research rept.,
Naval Personnel Research Activity San Diego Calif
John H. Steinemann, and Eugene A. Hooprich.
Jul 67, 35p Rept no. NPRA-SRR-68-1
See also AD-647 553.

Descriptors: (*Naval personnel, *Naval training), (*Electronics, *Technicians), Aptitude tests, Achievement tests, Feedback, Electronic equipment, Performance tests, Statistical functions, Maintenance, Communication equipment.

The report describes the tests and testing techniques employed to fulfill the evaluation requirements of the experimental training course for Electronics Technicians conducted from January 1964 to May 1966 by the Navy Training Research Laboratory, San Diego. Analyses were made of the correlations between precourse measures and course achievement criteria, and the relationships among several aspects of course achievement. Characteristics of effective evaluative techniques, and data concerning the relative contribution of

written and performance factors are summarized. (Author)
AD-658 316 HC$3.00 MF$0.65

THE PSYCHOLOGICAL IMPACT OF SOCIAL CHANGE IN THE PHILIPPINES.
Technical rept. Nov 65-May 67,
HRB-Singer Inc State College Pa
James M. McKendry, Margaret S. McKendry, and George M. Guthrie. 6 Jun 67, 195p Rept no. HRB-857-R-2
Contract Nonr-4794 (00), ARPA Order-825

Descriptors: (*Social psychology, Philippines), (*Rural areas, *Urban areas), Attitudes, Economics, Emotions, Culture, Population, Education, Social communication, Money, Recreation, Analysis of variance, Perception (Psychology), Behavior, Selection, Interactions.

The document contains a historical analysis of social change in the Philippines and the effect change has had and is likely to have upon the aspirations, attitudes, and opinions of people experiencing the change. Data from a field survey are used to investigate the descriptive validity of various hypotheses. Descriptive material is provided to illustrate what change involves.
AD-658 338 HC$3.00 MF$0.65

DIFFERENTIATION IN CROSS-CULTURAL COMMUNICATION,
Illinois Univ Urbana Group Effectiveness Research Lab
Uriel G. Foa. 1967, 24p
Contract DA-49-193-MD-2060
Prepared in cooperation with Israel Institute of Applied Social Research.
Availability: Published in Communication, Concepts and Perspectives 23p 1967.

Descriptors: (*Social communication, *Culture), Behavior, Social psychology, Perception (Psychology), Sociology, Children, Adults.

The following questions are discussed: What sort of cognitive organization do people have of their behavior toward other people, and of the behavior of other people toward them, in the various roles of a given social system and across systems, both at the normative and actual levels. How does this organizational pattern develop in the child and what is the influence of his culture on this development. What is different and what is similar between patterns developed in different cultures. (Author)
AD-658 398 Not available from CFSTI.

THE SIGNIFICANCE OF ROLE BEHAVIOR DIFFERENTIATION FOR CROSS-CULTURAL INTERACTION TRAINING.
Illinois Univ Urbana Group Effectiveness Research Lab
For primary bibliographic entry see Field 5K.
AD-658 410 Not available from CFSTI.

INFLUENCE OF CORRELATED VISUAL CUES ON AUDITORY SIGNAL DETECTION.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
R. C. Atkinson, R. A. Kinchla, J. Townsend, and J. I. Yellott, Jr.. 2 Nov 65, 26p NASA-CR-87408, TR-82
Contract NGR-05-020-036

Descriptors: *Auditory signal, *Signal detection, *Visual cue, Auditory, Correlation, Cue, Detection, Effect, Learning, Mathematics, Model, Probability, Signal, Visual.

For abstract, see STAR 05 20.
N67-34004 HC$3.00 MF$0.65

MOTIVATION OF R AND D ENTERPRENEURS-DETERMINANTS OF COMPANY SUCCESS.
Massachusetts Inst. of Tech., Cambridge.
I. M. Rubin, and H. A. Wainer. Jan 67, 20p
NASA-CR-87442, REPT.-234-67
Grants NSG-235, NSG-496

Descriptors: *Human performance, *Leadership, *Motivation, Administration, Management, Power.

For abstract, see STAR 05 20.
N67-34202 HC$3.00 MF$0.65

RECALL OF PAIRED-ASSOCIATES AS A FUNCTION OF OVERT AND COVERT REHEARSAL PROCEDURES.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Studies.
R. C. Atkinson, and J. W. Brelsford, Jr.. 21 Jul 67, 27p NASA-CR-87507, TR-115
Contract NGR-05-020-036

Descriptors: *Human performance, *Mathematical model, *Memory, Function, Human, Learning, Mathematics, Model, Performance.

For abstract, see STAR 05 20.
N67-34286 HC$3.00 MF$0.65

SPELLING DRILLS USING A COMPUTER-ASSISTED INSTRUCTIONAL SYSTEM.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
For primary bibliographic entry see Field 5I.
For abstract, see STAR 05 20.
N67-34432 HC$3.00 MF$0.65

SOME TWO-PROCESS MODELS FOR MEMORY.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
R. C. Atkinson, and R. M. Shiffrin. 30 Sep 66, 24p NASA-CR-87446, TR-107
Contract NGR-05-020-036
Presented At the Symp. on Mathematical Models of Psychological Processes, 18th Intern. Congr. of Psychology, Moscow, Aug. 1966

Descriptors: *Learning, *Mathematical model, *Memory, Buffer, Mathematics, Model, Probability, Process, Retrieval, Storage, System, Transient, Two.

For abstract, see STAR 05 20.
N67-34714 HC$3.00 MF$0.65

THE EFFECTS OF REINFORCEMENT INTERVAL ON THE ACQUISITION OF PAIRED-ASSOCIATE RESPONSES.
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
R. C. Atkinson, L. Keller, W. J. Thomson, and J. R. Tweedy. 10 Dec 65, 34p NASA-CR-87473, TR-88
Contract NGR-05-020-036

Descriptors: *Human reaction, *Learning, *Reinforcement, Acquisition, Association, Effect, Human, Interval, Pair, Presentation, Psychology, Rate, Reaction.

For abstract, see STAR 05 20.
N67-34749 HC$3.00 MF$0.65

THE VALUE OF TIME FOR PASSENGER CARS: AN EXPERIMENTAL STUDY OF COMMUTERS' VALUES. VOLUME II.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 13F.
PB-175 731 HC$3.00 MF$0.65

THE EFFECT OF THE 1966 TRANSIT STRIKE ON THE TRAVEL BEHAVIOR OF REGULAR TRANSIT USERS.
Barrington and Co., New York.
1966, 120p

Descriptors: (*Behavior, Transportation), (*Employee relations, *Transportation), Public opinion, Questionnaires, Passenger vehicles, Urban areas, Costs, Sampling, Statistical analysis, New York.

From January 1 to January 13, 1966 the City of New York experienced a major work stoppage by the operating employees. More than 40,000 transit employees struck the various companies, completely halting all services. Sixteen million residents in New York City and its metropolitan area were affected in one way or another. While negotiations were proceeding towards a strike settlement, public officials including the members of this Authority, expressed their concern, first, over the public welfare and second, over the effects of the strike on public passenger transit. Of major concern was the possible loss of rapid transit patronage and an increase in the use of other modes of travel which could further complicate the city's traffic and transportation problems. It was decided to attempt a study that would establish the effect of the strike on the public and on its future travel patterns. (Author)
PB-175 764 HC$3.00 MF$0.65

THE UNMARRIED MALE DRIVER UNDER TWENTY-FIVE: A PILOT SURVEY OF A HIGH-RISK DRIVER GROUP,
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 5K.
PB-175 766 HC$3.00 MF$0.65

5K. Sociology

PROJECT ECHO. PHASE I.
Final rept.,
General Research Corp Santa Barbara Calif
R. P. Arthol, and C. Bridge. 30 Jun 67, 111p Rept no. GRC-CR-0040-1
AROD-7299:1-RT
Contract DAHC02-67-C-0040, ARPA Order-965

Descriptors: (*Sociometrics, *Questionnaires), Culture, Attitudes, Data processing systems, Classification, Population, Effectiveness, Reliability, Children, Adults, Statistical analysis.
Identifiers: Echo project.

The ECHO technique utilizes a 'projective survey' format. The method is projective because the subjects (Ss) are permitted to define some variable swhich are usually predetermined by the investigators; it is a survey because groups rather than individuals are the object of concern. The value of this type of attitude survey and the theoretical logic underlying its development are explicated. (Author)
AD-657 613 HC$3.00 MF$0.65

THE ROLE OF MASS MEDIA AND INTERPERSONAL SOURCES OF INFORMATION IN DIRECTED SOCIAL CHANGE: A REVIEW OF THE LITERATURE ON THE PHILIPPINES.
Technical rept. 30 Jun 66-30 Jun 67,
HRB-Singer Inc State College Pa
James M. McKendry, and Salvador A. Parco. 6 Jun 67, 29p Rept no. HRB-857-R-3
Contract Nonr-4794 (00), ARPA Order-825
Prepared in cooperation with Inst. of Philippine Culture, Manila.

Descriptors: (*Social communication, *Philippines), Social sciences, Communication systems, Leadership, Public opinion, Attitudes, Behavior, Reviews, Effectiveness.
Identifiers: Mass media.

The report is concerned with the topic of the role of communications in directed social change in developing countries. Areas covered include opinion leadership, sources of information, innovativeness, factors facilitating adoption of innovations, the impact of mass media, and mass media vs. interpersonal sources of information. All papers represent recent work performed in the Philippines; most are limited circulation documents not likely to be available to U.S. social scientists. (Author)
AD-657 683 HC$3.00 MF$0.65

A COMMUNITY DEVELOPMENT RATING SCALE FOR PHILIPPINE POBLACIONES.
Technical rept. 1 Dec 66-16 Jun 67,
HRB-Singer Inc State College Pa
James M. McKendry, and Salvador A. Parco. 16 Jun 67, 39p Rept no. HRB-857-R-4
Contract Nonr-4794 (00), ARPA Order-825
Prepared in cooperation with Inst. of Philippine Culture, Manila.

Descriptors: (*Sociology, *Philippines), Urban areas, Social sciences, Economics, Factor analysis, Sociometrics, Sampling.

The paper presents an empirical demonstration of the degree to which it is possible to use a simple rating of which twenty-one facilities are present in a community as an index of that community's level of development. Two hundred nine poblacions in the seven Tagalog speaking provinces of Luzon were studied. A generalized Guttman type scale was devised which was found to have 96% reproducibility. Further, the scale correlated highly with one used elsewhere in the Philippines. Sample items include presence of a hotel, public telephone, shoe repair shop, plaza, high school, and gas station. Relationship to other types of scales is discussed. (Author)
AD-657 684 HC$3.00 MF$0.65

THE COMPUTER--HERO OR VILLAIN,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5H.
AD-657 812 Not available from CFSTI.

THE SPATIAL STRUCTURE OF A SELECTED INTERPERSONAL CONTACT: A REGIONAL COMPARISON OF MARRIAGE DISTANCES IN INDIA.
Technical rept.,
Northwestern Univ Evanston Ill Dept of Geography
Robert C. Mayfield. Apr 67, 39p Rept no. TR-6
Contract Nonr-1228 (33)
See also AD-628 611.

Descriptors: (*Geography, India), (*Rural areas, Sociology), (*Roads, *Transportation), Analysis of variance, Communication systems, Mathematical models, Computer programs, Behavior, Population, Agriculture, Labor, Job analysis, Urban areas.

The spatial pattern of marriage distances, viewed as a possible surrogate for information field data, is examined in three rural areas of India (portions of the undivided Punjab, Gujarat, and Mysore). Twenty-four villages, stratified by size and communications class, were studied and within each village informants were further stratified on the basis of a farmer-service worker occupational classification. In terms of mean distance to wife's village, significant differences were observed between regions and occupation types. Some attempt was also made to study patterns of contact with friends living outside the village, and to determine if informants could provide accurate estimates of distance and direction.
AD-657 852 HC$3.00 MF$0.65

IS THERE A LONG-RUN TREND TOWARD CONCENTRATION IN THE INTERNATIONAL SYSTEM,
Rand Corp Santa Monica 8alif
For primary bibliographic entry see Field 5D.
AD-658 010 HC$3.00 MF$0.65

SOCIAL IMPLICATIONS OF THE COMPUTER UTILITY,
Rand Corp Santa Monica Calif
Paul Armer. Aug 67, 17p Rept no. P-3642
Prepared for presentation at Informatics/UCLA Symposium on Computers and Communications - Toward a Computer Utility held at UCLA 20-22 March 1967. Hard copy available from RAND, Corp. Santa Monica, Calif., $1.00.
Availability: Published in Copyrighted journal.

Descriptors: (*Computers, *Sociology), Automation, Predictions, Production, Obsolescence theory, Economics, Employment.
Identifiers: Privacy.

The paper concerns the social implications of the computer utility concept, with emphasis on the privacy issue and what can be done about it.
AD-658 249 Not available from CFSTI.

THE USE OF CONTENT ANALYSIS FOR EXPLANATORY STUDIES,
California Univ Berkeley Survey Research Center
Robert Edward Mitchell. 1967, 17p Rept no. SRC-A68
AFOSR-67-2096
Grant AF-AFOSR-1003-66
Availability: Published in Public Opinion Quarterly v31 p230-41 1967.

Descriptors: (*Sociometrics, Data processing systems), Linguistics, Applied psychology, Optical scanning, Digital computers, Analysis, Public opinion, Questionnaires, Social sciences.

The article outlines the linguistic, methodological, substantive, and technological developments that are likely to lead to an increase in attention to content-analysis procedures. The psycholinguistic and sociolinguistic studies on the uses and functions of language, the increased knowledge about the structure of languages, optical scanning devices for digitizing large quantities of materials directly into a machine-manipulable medium, and machine techniques for classifying and coding such materials all point to the possibility of very cheaply conducting content analysis of a variety of topics. (Author)
AD-658 264 Not available from CFSTI.

DIFFERENTIATION IN CROSS-CULTURAL COMMUNICATION,
Illinois Univ Urbana Group Effectiveness Research Lab
For primary bibliographic entry see Field 5J.
AD-658 398 Not available from CFSTI.

THE SIGNIFICANCE OF ROLE BEHAVIOR DIFFERENTIATION FOR CROSS-CULTURAL INTERACTION TRAINING.
Technical rept.,
Illinois Univ Urbana Group Effectiveness Research Lab
Uriel G. Foa and Martin M. Chemers. 1967, 14p Rept no. TR-22
Contract DA-49-193-MD-2060
Prepared in cooperation with Israel Institute of Applied Social Research.
Availability: Published in International Journal of Psychology v2 n1 p45-57 1967.

Descriptors: (*Behavior, Culture), Training, Sociology, Social psychology, Attitudes, Teaching methods, Training devices.
Identifiers: Cross culture (Sociology).

In order to teach people to conduct themselves effectively with people belonging to another culture, it appears necessary to identify intercultural differences which are critical in working cooperatively in heterogeneous cultural groups. A theoretical analysis of the development of the distinction of roles, in and between social systems, of traditional and modern cultures, leads to the hypotheses that traditional cultures emphasize the distinction between roles of the same system, whereas the modern culture tends to emphasize the distinction between comparable roles of different systems. These hypotheses were tested through a study of the contents of a program of cultural formation which appears to improve the performance and the interpersonal relatiens of an individual in working with heterocultural groups. The program is comprised of 55 episode-problems in which the student tries to find the causes of the conflict. The episode-problems are drawn from critical incidents described during the course of conversations by individuals who have had intercultural experience as well as from the sacred literature of the culture under consideration, the Middle East. The results confirm the hypotheses and show that the distinction of roles constitutes an important domain in intercultural formation. An analysis of the aspects of the contents of the program of formation is presented and utilized to formulate several propositions toward systematizing the program. The relationship between socialization and formation in view of acculturation is also briefly discussed.
AD-658 410 Not available from CFSTI.

NON-INSTITUTIONAL HOUSING FOR THE ELDERLY,
National Swedish Inst. for Building Research, Stockholm.
Sven Thiberg. Sep 66, 34p Rept. no. 5:1967

Descriptors: (*Housing, Adults), Sweden, Design, Aging (Physiology), Housing projects, Sociology.

Integrated dwellings for the elderly are occurring to an ever-increasing extent in Sweden. The dwellings may also be assembled in group arrangements, pensioners homes, where the households take care of themselves independently and in thinly-populated districts there do occur newlybuilt temporary dwellings for old people. The building of housing for the elderly is financed in the same way as the greater part of the rest of Swedish housing construction with the help of government loans and local authorities grant rent subsidies for pensioners. Older one-and two-family houses can be renovated for use as housing for old people with the help of government improvement loans. The standard prevailing in the types of housing is checked at the planning stage and the fulfilment of the fixed minimum requirements is one condition for a government loan. As far as our still incomplete knowledge of the subject allows, the special housing requirements of the elderly have been taken into consideration in the norms. The equipment standard must be adapted to the needs of an independent household in the case of both cooking and of hygienic facilities. The aim in the space standard is at least 1 room and kitchen for a single person and 2 rooms and kitchen for a household of two persons. The flats should be placed either in low blocks or in blocks with lifts so that they can be easily reached and it is desirable to have them situated comfortably near shops and other community services. Coordination between housing situation, housing design and the community care and supervision organization has a decisive effect both on the quality of the care and on community expenditure. Adaption to local conditions is also important. (Author)
PB-175 667 HC$3.00 MF$0.65

THE UNMARRIED MALE DRIVER UNDER TWENTY-FIVE: A PILOT SURVEY OF A HIGH-RISK DRIVER GROUP,
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
Stanley H. Schuman, Nathaniel J. Ehrlich, Donald C. Pelz, and Melvin Selzer. Nov 66, 29p Rept. no. 32933-1

Descriptors: (*Motor vehicle operators, Males), (*Sociometrics, Motor vehicle operators), Questionnaires, Alcohols, Behavior, Emotions, Aging (Physiology), Reaction (Psychology), Ingestion (Physiology), Attitudes, Motor vehicle accidents.

The main topics of the survey include alcoholism, risk-taking in the male driver under twenty-five, and the unpredictable nature of automobile driving behavior. A questionnaire was designed to elicit information on the following major subtopics: the subject's demography, including age, income bracket, etc.; his habitual driving behavior; his prevailing emotional state; the degree to which his emotional responses to various life situations (e.e., his moods) are carried over into driving situations; his drinking habits, as well as his drinking-and-driving habits; and his preferences and attitudes concerning both automobiles and law-enforcement agencies. A sample questionnaire is included in the report.
PB-175 766 HC$3.00 MF$0.65

THE RULES OF ALCOHOL, DRUGS AND ORGANIC FACTORS IN FATAL SINGLE VEHICLE ACCIDENTS.
Final rept.
California State Dept. of the Highway Patrol, Sacramento.
Jun 67, 133p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle accidents, Analysis), Addiction, Drugs, Alcohols, Cardiovascular diseases, Blood chemistry, Population, Motor vehicle operators, Diurnal variations.

The study considered three aspects of the traffic accident problem: alcohol, drugs, and organic factors. The study data represented drivers dying, within 15 minutes, in single car accidents in the State of California during a two year period. Results indicated that among study drivers, alcohol is a greater problem with men than women. Other findings relating to alcohol were as follows: the alcohol problem is most pronounced in the 30 to 50 age group, is significant on all seven days of the week (it being somewhat higher on weekends) and highly prevalent between midnight and 3:00 a.m. when 26% of the accidents occurred in which 83% of the drivers had a blood alcohol level in excess of 0.1. Drinking drivers had a higher accident, traffic violation and police contacts record than non-drinking drivers but the differences were not of sufficient magnitude to warrant a program of driver control. Major findings from the analysis of drug data were as follows: Thirteen percent of the study sample drivers were found to have taken drugs (as determined from a blood sample); drug usage increases proportionately with age, and the alcohol problem is also present among drug users. The third factor studied was organic factors. Of all study sample drivers studied, 10.5% were found to have died from natural causes (over 90% from heart related causes) rather than from the traffic accident. These victims tended to be men and from the older population. Also, these drivers tended to be more of a daytime problem whereas drivers dying from the traffic accident tended to be a nighttime problem (primarily due to alcohol). A very low occurrence of alcohol was found among drivers dying from natural causes, while the drug usage was higher. (Author)
PB-175 942 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

A MATHEMATICAL MODEL OF THE HUMAN EXTERNAL RESPIRATORY SYSTEM,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 6P.
AD-246 199 HC$3.00

A POLY I CRYOFORM,
Naval Medical Research Inst Bethesda Md
David B. Millar, and Melba A. Grafius. 15 Jan 67, 6p
Availability: Published in Currents in Modern Biology v1 p121-4 1967.

Descriptors: (*Polymers, Nucleotides), (*Nucleotides, Molecular structure), Complex compounds, Fluorescence, Polarization, Molecular rotation, Molecular association, Low-temperature research.
Identifiers: Polyriboinosinic acids.

During the investigation of the properties of fluorescent conjugates of polyriboinosinic acid (poly I) large irreproducibility was noted in the polarization (25C) values for a particular conjugate. It is shown that the phenomenon is due to a stable, increased ordering of the secondary structure of poly I attained by brief exposure to low temperatures. (Author)
AD-657 555 Not available from CFSTI.

BIOSYNTHESIS OF MUSTARD OIL GLUCOSIDES: CONVERSION OF PHENYLACETALDEHYDE OXIME AND 3-PHENYL-PROPIONALDEHYDE OXIME TO GLUCOTROPAEOLIN AND GLUCONASTURTIIN,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
E. W. Underhill. 13 Apr 67, 3p
NRC-9643
Availability: Published in European J. Biochem v2 p61-3 1967.

Descriptors: (*Glycosides, Biosynthesis), (*Plants (Botany), Metabolism), (*Amino acids, Metabolism), (*Oximes, Metabolism), Aldehydes, Tracer studies, Phenylalanine, Labeled substances, Canada.
Identifiers: Gluconasturtiin, Glucotropaeolin, Nasturtium officinale, Tropaeolum majus.

Apart from certain amino acids none of the nitrogenous intermediates involved in the biosynthesis of mustard oil glucosides have, until now, been determined. Results consistent with the hypothesis--amino acids to aldehyde oximes to mustard oil glucosides--are presented for glucotropaeolin and gluconasturtiin. Administration of DL-(2 - 14C)phenylalanine and (1 - 14C)phenylacetaldehyde oxime to Tropaeolum majus L. shoots resulted in a greater incorporation of the tracer from the latter into the aglycone moiety of glucotropaeolin; incorporation of 14C from phenylacetaldehyde oxime into the aglycone was without randomization. Radioactive phenylacetaldehyde oxime was isolated from T. majus shoots which were fed DL- (2-14C)phenylalanine. The extent of conversion of 14C into the aglycone of gluconasturtiin was similar when 3-phenyl (1-14C)propionaldehyde oxime and DL-2-amino-4-phenyl (2-14C)butyric acid were fed to Nasturtium officinale R. Br. There was no randomization of labelled carbon in gluconasturtiin aglycone derived from 3-phenylpropionaldehyde oxime. (Author)
AD-657 700 Not available from CFSTI.

THE EXOCELLULAR GLYCAN PRODUCED BY MYXOBACTERIUM 402,
National Research Council of Canada Ottawa (Ontario) Div of Biosciences
I. M. Morrison, R. Young, M. B. Perry, and G. A. Adams. 7 Apr 67, 4p
NRC-9598
Availability: Published in Canadian Journal of Chemistry v45 p1987-90 1967.

Descriptors: (*Myxobacteriales, Polysaccharides), Chromatographic analysis, Separation, Quantitative analysis, Canada.
Identifiers: Glycan.

The note records the isolation of an exocellular glycan produced by Myxobacterium 402. Quantitative analysis of the glycan showed it to have the following approximate glycose composition: D-glucose, 14 parts; D-mannose, 1 part; D-rhamnose, 6 parts; 3-O-methyl-D-rhamnose, 5 parts; 2-O-methyl-D-rhamnose, 5 parts; and 2-amino-2-deoxy-D-glucose, 1 part.
AD-657 701 Not available from CFSTI.

STUDIES ON LEVELS OF PENICILLAMINE-INDUCED CUPRIURESIS IN HETEROZYGOTES OF WILSON'S DISEASE,
Naval Medical Research Unit No 2 Taipei (Taiwan) Dept of Biochemistry
For primary bibliographic entry see Field 6E.
AD-657 708 Not available from CFSTI.

WATER INSOLUBLE DERIVATIVES OF PROTEINS WITH BIOLOGICAL ACTIVITY.
Final technical rept. 1 Jul 66-30 Jun 67,
Weizmann Inst of Science Rehovoth (Israel)
Ephraim Katchalski. 30 Jun 67, 20p
AFOSR-67-2025
Grant AF-EOAR-14-67

Descriptors: (*Enzymes, Reaction kinetics), (*Papain, Reaction kinetics), (*Chymotrypsin, Reaction kinetics), Proteins, Peptides, Polymers, Synthesis (Chemistry), pH, Membranes, Adsorp on, Nitrocellulose, Substrates, Concentration (Chemistry), Solids, Israel.

A number of derivatives of papain and chymotypsin were prepared in which the active enzyme was covalently bound to a high-molecular weight carrier (e.g., poly-L-ornithyl papain, poly-L-glutamyl chymotrypsin). A kinetic study was made of these compounds, with particular attention given to pH activity profiles. Papain-collodion membranes were also prepared and were examined with respect to the effect of local gradients of enzyme and substrate on their kinetic activity.
AD-657 797 HC$3.00 MF$0.65

PRELIMINARY REPORT ON SOLUBLE ANTIGEN FLUORESCENT ANTIBODY TECHNIQUE FOR IDENTIFICATION OF HOST SOURCE OF MOSQUITO BLOOD MEALS,
Walter Reed Army Inst of Research Washington D C
James W. Gentry, Chester G. Moore, and David E. Hayes. 1967, 3p
Availability: Published in Mosquito News v27 n2 p141-3 1967.

Descriptors: (*Fluorescent antibody techniques, Blood), Chickens, Humans, Monkeys, Antigen-antibody reactions, Anopheles, Aedes, Immune serums.

Tests were conducted with Anopheles quadrimaculatus and Aedes aegypti to identify blood meals from chickens, humans and monkeys up to 24 hours after feeding. During tests of more than 100 blood smears only two samples have given negative results; one monkey blood taken 16 hours post feeding and one chicken blood taken 24 hours after feeding, the latter being stored more than 4 months prior to testing. There was some cross-reaction between human and monkey antigens but homologous series produced strong reactions when compared to heterologous series which gave weak reactions. These preliminary results indicate that in areas where cross-reactions occur, identifications can be made easily and accurately if paired antisera are used. (Author)
AD-657 831 Not available from CFSTI.

HUMAN ABSORPTION OF HEMOGLOBIN-IRON.

Revised ed.,
Walter Reed Army Inst of Research Washington D C
Marcel E. Conrad, Burton I. Benjamin, Harold L. Williams, and Arthur L. Foy. 19 Jan 67, 6p
Revision of manuscript submitted 9 Jan 67.
Availability: Published in Gastroenterlogy v53 n1 p5-10 1967.

Descriptors: (*Iron, Absorption (Biological)), Blood chemistry, Hemoglobin, Diet, Humans, Intestines, Membranes (Biology), Mucus, Polymerization.

Hemoglobin can be an important source of dietary iron. Hemoglobin-iron is absorbed by human subjects selectively depending upon body requirements for iron. Heme is split from globin within the intestinal lumen and absorbed into the duodenal mucosa as an intact metalloporphyrin. Iron is split from heme within intestinal cells and transferred into the plasma. Substances which decrease the polymerization of heme increase the absorption of heme-iron. A comparison of human and animal studies suggests that the selective absorption of heme-iron is regulated either by controlled release of iron from heme within intestinal cells or by regulation of the quantity of iron transferred from intestinal cells into the plasma or both. (Author)
AD-657 837 Not available from CFSTI.

COULOMETRIC TITRATION OF BLOOD AMMONIA,
Walter Reed Army Inst of Research Washington D C
Gary D. Christian, and Fredric J. Feldman. 27 Mar 67, 7p
Availability: Published in Clinica Chimica Acta v17 p87-93 1967.

Descriptors: (*Ammonia, Microanalysis), (*Blood chemistry, Ammonia), pH, Separation, Volumetric analysis, Test methods, Blood analysis.

Blood ammonia after being separated by microdiffusion was determined by coulometric titration with electrogenerated hypobromite using a sensitive amperometric end point. An optimum pH of 8.6 for the titration was found to give reproducible results at all levels encountered. Time for a single analysis was 10-15 min. (Author)
AD-657 838 Not available from CFSTI.

INHIBITORS OF NADH-UBIQUINONE REDUCTASE FROM MITOCHONDRIA,
California Univ San Francisco Dept of Biochemistry
James Salach, H. D. Tisdale, Thomas P. Singer, and Peter Bader. 7 Apr 67, 5p
Contract Nonr-5024 (00), Grant NSF-GB-3762
Prepared in cooperation with Veteran's Administration Hospital, San Francisco, Calif. Div. of Molecular Biology.

Descriptors: (*Oxidoreductases, Enzyme inhibitors), (*Enzyme inhibitors, *Venoms), Mitochondria, Tissue extracts, Serum albumin, Chromatographic analysis.

Results are reported concerning a study of the mechanism of the abolition of the mitochondral NADH-ubiquinone reaction by NAJA NAJA venom.
AD-657 899 Not available from CFSTI.

THE SEMICONDUCTIVE PROPERTIES OF LIPIDS AND THEIR RELATION TO THE ELECTRICAL CONDUCTIVITY OF LIPID BILAYERS.
Technical rept.,
Michigan State Univ East Lansing Dept of Biophysics
Gordon Lee Jendrasiak. Aug 67, 136p Rept no. TR-1
Contract Nonr-2587 (06)

Descriptors: (*Lipids, Electrical conductance), (*Semiconducting films, Lipids), Phospholipids, Transport properties, Heat of activation, Hydrates, Iodides, Dielectric properties, Complex compounds, Spectroscopy.

A study was made showing that lipid films in the dry state behave as electrical semiconductors with high activation energies. For phospholipids, these activation energies range from 4.8 to 6.3 e.v. Upon hydration, the activation energies decrease whereas the conductivities increase. An effect parallel to that of water is found with exposure of lipids to iodine vapor; here the activation energies range from 2.7 to 3.2 e.v. With the adsorption of either water or iodine, the dielectric constant, frequency dispersion and dissipation factor of the lipids increased over the dry state values. Lipid bilayers were found to exhibit an increase of 1000 to 100000 in their electrical conductivity with exposure of the bilayer to iodine solution. Spectroscopic evidence was obtained indicating that lipids form charge-transfer complexes with iodine. This charge transfer evidence is taken as suggestive of a possible electronic conduction mechanism, not only in the lipid films, but also in the lipid bilayers.
AD-657 954 HC$3.00 MF$0.65

IMMUNOCHEMICAL STUDIES ON BLOOD GROUPS. XXXVI. THE NATURE OF THE UNSATURATED RESIDUE IN SOME OLIGOSACCHARIDES PRODUCED BY THE ACTION OF SODIUM HYDROXIDE-SODIUM BOROHYDRIDE ON BLOOD-GROUP A, B, AND H SUBSTANCES.
Revised ed.,
Columbia Univ New York Coll of Physicians and Surgeons
Kenneth O. Lloyd, and Elvin A. Kabat. 9 Jan 67, 13p
Contract Nonr-266 (13), Grant NSF-GB-3675
Revision of manuscript submitted 14 Dec 66.
Prepared in cooperation with Presbyterian Hospital, New York, Neurological Inst. Research supported in part by PHS.
Availability: Published in Carbohydrate Research v4 p165-77 1967.

Descriptors: (*Blood groups, *Carbohydrates), Decomposition, Chromatographic analysis, Sodium compounds, Hydroxides, Borohydrides, Erythrocytes, Immunology, Blood chemistry.

Treatment of blood-group substances with sodium hydroxide-sodium borohydride gives a series of oligosaccharides, many of which are terminated by an unsaturated alditol residue, that of a 3-hexene-1,2,5,6-tetrol (R).cis-Hydroxylation of authentic samples of the trans-erythro and D-threo forms of this alditol with hydrogen peroxide and osmium tetraoxide gave the expected products, namely, DL-glucitol from the former, and D-mannitol and D-iditol from the latter. Three of the unsaturated oligosaccharides from blood-group substances, when hydroxylated under the same conditions and the product then hydrolyzed, gave mixtures of these three hexitols. The hexitols were identified by gas chromatography of their hexaacetates under conditions that permitted the separation of all six possible hexitol hexaacetates. Each oligosaccharide sample, is, therefore, a mixture of two oligosaccharides, one terminated by a trans-3-hexene-D-threo- and the other by a trans-3-hexene-erythro-tetrol residue. Periodate oxidation of the mixture of hexitol-containing disaccharides obtained by hydroxylation of beta-D-GNAcp- (1-6)-R showed that the 2-acetamido-2-deoxy-hexose residue is linked to C-6 of the hexenetetrol. The structures of the oligosaccharides obtained from blood-group substances by degradation with sodium hydroxide-sodium borohydride are compared with those from hog submaxillary mucin and with those formed by the hydrolysis of blood-group substances with triethylamine. (Author)
AD-658 082 Not available from CFSTI.

IMMUNOCHEMICAL STUDIES ON BLOOD GROUPS. XXXVII. THE STRUCTURES OF DIFUCOSYL AND OTHER OLIGOSACCHARIDES PRODUCED BY ALKALINE DEGRADATION OF BLOOD GROUP A, B, AND H SUBSTANCES; OPTICAL ROTATORY DISPERSION AND CIRCULAR DICHROISM SPECTRA OF THESE OLIGOSACCHARIDES,
Columbia Univ New York Coll of Physicians and Surgeons
Kenneth O. Lloyd, Sherman Beychok, and Elvin A. Kabat. 3 Jan 67, 7p
Contract Nonr-266 (13), Grant NSF-GB-3675
Prepared in cooperation with Presbyterian Hospital, New York. Neurological Inst. Research supported in part by PHS.
Availability: Published in Biochemistry v6 n5 p1448-54 May 1967.

Descriptors: (*Blood groups, *Carbohydrates), Sodium compounds, Hydroxides, Borohydrides, Biosynthesis, Molecular structure, Chromatographic analysis, Molecular rotation, Stereochemistry.

Treatment of blood group A, B, and H substances with NaOH-NaBH4 yielded three monofucosyl and three difucosyl oligosaccharides. The structure of the monofucosyl H active oligosaccharide is alpha - L - fucopyranosyl- (1 - 2) - beta - D-galactopyranosyl- (1 - 4) - 2 - acetamido - 2-deoxy - beta - D - glucopyranosyl - R (R is CH2OHCHOHCH = CHCHOHCH2OH). The corresponding A and B oligosaccharides have 2-acetamido-2-deoxy-D-galactopyranose and -D-galactose, respectively, linked alpha- (1-3) to the galactose residue of this structure. The difucosyl oligosaccharides have basically the same structures but with a second fucose which is linked to the N-acetylglucosamine residue of the corresponding monofucosyl structures. Methylation of these oligosaccharides and identification of the glucosamine methyl ether formed as 6-O-methyl-D-glucosamine show that the fucose is substituted on the C-3 position of the N-acetylglucosamine. The optical rotatory dispersion (ORD) spectra of the monofucosyl oligosaccharides show pronounced Cotton effect troughs at about 220 millimicrons due to the 2-acetamido group of the N-acetylhexosamine residues. The circular dichroism (CD) spectra have strong ellipticity bands which are due to the same chromophore. (Author)
AD-658 188 Not available from CFSTI.

THE RELATION BETWEEN AMINO ACID AND GLUCOSE METABOLISM IN DEVELOPING BRAIN.
Keio Univ Tokyo (Japan) Dept of Physiology
For primary bibliographic entry see Field 6P.
AD-658 208 HC$3.00 MF$0.65

REPORT ON THIRD YEAR OF RESEARCH ON ASCORBIC ACID, BIOLOGICAL FUNCTION AND CHEMISTRY,
Colorado Univ Boulder Dept of Chemistry
Bert M. Tolbert. 1 Apr 67, 39p
Contract DA-49-193-MD-2611
Prepared in cooperation with Army Medical Research and Nutrition Lab., Denver, Colo.

Descriptors: (*Ascorbic acid, Biochemistry), Oxidation, Synthesis, Labeled substances, Tracer studies, Excretion, Urine, Microorganisms, Chemical bonds.

The following areas were investigated: (1) Chemistry of the ascorbic and isoascorbic acids and their oxidation products (Bell); (2) Synthesis of L-ascorbic-6-14C acid (Bell, Bevill); (3) Distribution of radioactivity from 14C and 3H labeled ascorbate in rats (Bell, March); (4) Identification of urinary excretion products from ascorbic acid, I (Karr); (5) Identification of urinary excretion products from ascorbic acid, II, (Scharf); (6) Identification

of urinary excretion products from ascorbic acid, III, (Hill); (7) Cellular and molecular distribution of label from ascorbate in rats (Scharf); (8) Preparation of an ascorbate-requiring microorganism (Ray).
AD-658 213 HC$3.00 MF$0.65

THE MILITARY APPLICABILITY OF RESEARCH ON QUANTITATION OF STRESS BY CATECHOL AMINE ANALYSIS.
Federation of American Societies for Experimental Biology Bethesda Md Life Sciences Research Office
15 Jun 67, 153p
Contract DA-49-092-ARO-70

Descriptors: (*Stress (Physiology), *Amines), Excretion, Urine, Performance (Human), Metabolism, Hormones, Blood plasma, Tissues (Biology), Secretion, Stress (Psychology), Behavior, Performance tests, Military medicine, Levarterenol, Epinephrine, Biosynthesis, Quantitative analysis.

Contents: Stresses that affect performance; Procedures for assaying the effects of stress; Summary of present knowledge of catechol amines: Occurrence; metabolism; excretion; biologic behavior; release, turnover, physiologic activities, psychologic effects, and interrelationships with other hormones); Methodology in analyses of catechol amines; in urine, in plasma, and in tissues; Experiments relative to the correlation between the secretion (or excretion) of catechol amines and the various types of stress in the assessment of performance increments and decrements or 'quantitation of stress by catechol amine analysis' in humans and animals; Difficulties associated with the correlation of catechol amine release and performance and suggested areas for additional research; Unanswered questions relative to the correlation between catechol amine release and stress and performance; Military applicability of the correlation between catechol amines release and the assessment of performance increments and decrements.
AD-658 232 HC$3.00 MF$0.65

A COMPARISON OF INVARIANT RESIDUES IN THE VARIABLE AND CONSTANT REGIONS OF HUMAN K, HUMAN L, AND MOUSE K BENCE-JONES PROTEINS,
Columbia Univ New York Coll of Physicians and Surgeons
Elvin A. Kabat. 3 May 67, 5p
Contract Nonr-266 (13), Grant NSF-GP-3675
Prepared in cooperation with Neurological Inst.
Availability: Published in Proceedings of the National Academy of Sciences v58 n1 p229-33 Jul 1967.

Descriptors: (*Proteins, Molecular association), Amino acids, Antigens + antibodies, Molecular structure, Gamma globulin, Immunology.
Identifiers: Bence-Jones proteins.

Studies of the tryptic peptides by fingerprinting and determination of the sequences of human K, human L, and mouse K Bence-Jones proteins have established that each of these three groups of proteins is made up of a variable and a constant region, comprising approximately the amino-terminal and carboxy-terminal halves of the molecules, respectively. In the variable region individual Bence-Jones proteins of each group may have different amino acid substitutions at a given position in the sequence, while in the constant region all proteins of each group have the same sequence except for position 191 in human K proteins, which is associated with Inv specificity. With sequences arranged to give maximum homology, a comparison of these two regions in the various proteins showed that the variable region has very few species-specific residues, e.g., residues in which the human K and L proteins differed from the mouse K, while many such differences were present in the constant region; with the publication of the complete sequence of a type L Bence-Jones protein, these values are now at most 2 to 4 as compared with 36 species-specific residues, respectively. From this it was hypothesized that the variable region tended to be preserved during evolution perhaps because of its importance for antibody combining sites, while the constant region, being less critical, had considerable freedom to mutate during evolution without seriously influencing the variable portion. A further implication of this hypothesis would be that the invariant sequences of the two regions differed in composition and structure and that the variable regions of the three groups of Bence-Jones proteins might have a unique composition. (Author)
AD-658 235 Not available from CFSTI.

STRUCTURE AND PROPERTIES OF LIQUID WATER,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 7D.
AD-658 245 Not available from CFSTI.

HALL EFFECT IN DIELECTRIC MEDIA: MICROWAVE X-BAND FARADAY ROTATION OF WATER ABSORBED ON HEMOGLOBIN,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 7D.
AD-658 246 Not available from CFSTI.

CONFORMATIONAL ENERGY AND CONFIGURATIONAL STATISTICS OF POLY-L-PROLINE,
Stanford Univ Calif Dept of Chemistry
For primary bibliographic entry see Field 7C.
AD-658 263 Not available from CFSTI.

RATIO OF FRAGMENT I/II IN GAMMA-GLOBULINS AND RABBIT ANTIBODIES,
Indiana Univ Bloomington Dept of Chemistry
K. L. Knight, and F. Haurowitz. 1967, 1p
Grants NSF-GB-2519, PHS-GM-1852
Research supported in part by ONR and AEC.
Availability: Published in Federation Proceedings v26 n2 Mar/Apr 1967.

Descriptors: (*Gamma globulin, Chemical analysis), Antigens + antibodies, Papain, Separation, Rabbits, Injection (Medicine), Labeled substances.

The specific Fab fragment obtained by papain digestion of normal gamma-globulins or antibodies is a mixture of the two fragments I and II, separable on CM-cellulose (Porter, 1959). We determined the ratio I/II in the non-specific gamma-globulins of young and old rabbits, after a series of intravenous or intramuscular injections of As-BSA (bovine serum albumin coupled with diazotized arsanilic acid). Gamma-Globulin samples were analyzed 2, 4, 6, 8 and 10 weeks after the first injection. The ratio I/II was greater than 1.0 in all samples and showed no relation to the age of the animals, nor to the route or frequency of injections. In rabbits injected with the doubly labelled As-R4N-BSA (R4N = p-azophenyl-N-trimethyl ammonium), hapten-specific anti-As and anti-R4N antibodies were isolated from the serum. Both antibodies yielded mixtures of I and II. The ratio I/II was always higher in the Fab fragment from anti-R4N than in that from anti-As antibody prepared from the same serum, indicating a higher content of the more acidic fragment I in anti-R4N. (Author)
AD-658 294 Not available from CFSTI.

HETEROGENEITE DE L'ACIDE RIBONUCLEIQUE DES NOYAUX CELLULAIRES AU COURS DE LA CICATRISATION DES PLAIES (Heterogeneity of the Ribonucleic Acid in Cellular Nuclei during the Healing of Wounds),
Loyola Univ Chicago Ill Stritch School of Medicine
Martin B. Williamson, and Thomas Thachet. 1967, 12p
Contract Nonr-3502 (02)
Availability: Published in Arch. de Biochim. Cosm. v10 n98 p10-21 1967.

Descriptors: (*Healing, *Ribonucleic acids), Tissues (Biology), Regeneration, Nuclei (Biology), Collagen, Biosynthesis, Proteins.
AD-658 307 Not available from CFSTI.

PROCEEDINGS OF THE 12TH ANNUAL BIOASSAY AND ANALYTICAL CHEMISTRY MEETING HELD AT GATLINBURG, TENNESSEE, OCTOBER 13-14, 1966,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 18.
CONF-661018 HC$3.00 MF$0.65

BIOLOGICAL SIGNIFICANCE OF HIGH MOLECULAR WEIGHT POLYPEPTIDES FINAL REPORT, JUN. 1, 1963 - JUN. 30, 1966.
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Biophysics.
E. Katchalski. 1964, 7p AFOSR-67-1208, AD-653641
Contracts AF-EOAR-63-59, AF-EOAR-64-73

Descriptors: *Amino acid, *Biological cell, *Enzyme, *Membrane, Acid, Activity, Amino, Artificial, Bacteria, Biological, Cell, Characterization, Insolubility, Interaction, Nucleic, Peptide, Polymer, Preparation, Trypsin, Virus.

For abstract, see STAR 05 20.
N67-34016 HC$3.00 MF$0.65

EFFECT OF SURFACES ON THE BLOOD.
Annual rept. for period ending 28 Jul 66,
Harris Research Labs., Inc., Washington, D. C.
Lyman Fourt. 28 Jul 66, 44p
Contract PH-43-64-498

Descriptors: (*Anticoagulants, Surface properties), Heparin, Blood coagulation, Chemical bonds, Interfaces, Interactions, Blood, Adsorption, Blood plasma, Vinyl plastics, Pyridines, Stereochemistry, Copolymerization, Coatings.

The work was chiefly concerned with the highly effective anticoagulant surfaces which bear heparin attached by ionic bonds, particularly the graphite-benzalkonium-heparin surface and surfaces of poly (4-vinyl pyridine) treated with heparin, plus the compounds of bases with heparin, with respect to how these surfaces and materials interact with the blood. The effect of heparin bearing surfaces on the contact activation phase of blood coagulation, involving Factors XI and XII, appears to be minor. Heparin is known, however, to combine with the surface activation product, the activated form of Factor XI, which is produced under the influence of Factor XII after it has been activated by adsorption or by specific agents such as ellagic acid. It was found that the quantity of dissolved heparin required to block the further progress of the coagulation system is less, if the rate of contact activation is less, which may be a part of the adsorbed heparin. At least two hypotheses are advanced to explain the effect of heparin introduced on the surface which is exposed to the blood: (1) That the adsorbed heparin ties up the product of contact activation while this is on the surface; and/or (2) that heparin diffusing away from the surface is in relatively high concentration within the diffusion layer and so is favorably located to react with contact activation product as this is being produced within the same diffusion layer, especially if the rate of activation is slow. (Author)
PB-175 678 HC$3.00 MF$0.65

A COMPUTER ORIENTED SCHEME FOR CODING CHEMICALS IN THE FIELD OF BIOMEDICINE.
Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
For primary bibliographic entry see Field 5B.
PB-175 808 HC$3.00 MF$0.65

6B. Bioengineering

EVOKED POTENTIALS: THREE-DIMENSIONAL DISPLAY,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Stephen K. Burns, Alexander A. Borbely, and Robert D. Hall. 29 Apr 67, 2p
Contract DA-28-043-AMC-02536 (E), Grant NsG-496
Availability: Published in Science v157 n3787 p457-9 Jul 28 1967.

Descriptors: (*Nervous system, Electrophysiology), Brain, Sensory perception, Stimulation, Responses, Display systems, Chlorpromazine, Sleep, Photographs, Digital computers, Medical equipment.

Procedures are described for displaying large numbers of evoked potentials. A photographic superposition of average evoked responses, with the concurrent modulation of the brightness of each trace, yields a display having the appearance of a three-dimensional surface formed from hundreds of average responses. (Author)
AD-657 925 Not available from CFSTI.

MEDICAL APPLICATIONS OF AEROSPACE SCIENCE AND TECHNOLOGY QUARTERLY REPORT, 1 MAY - 31 JULY 1967.
Midwest Research Inst., Kansas City, Mo.
D. Bendersky. 15 Aug 67, 47p NASA-CR-87407, QR-1
Contract NASR-63/13/

Descriptors: *Aerospace technology, *Biology, *Medicine, Aerospace, Apparatus, Blood, Brain, Ear, Electrocardiography, Eye, Measuring, Microminiaturization, Muscle, Pressure, Respiration, Speech, Technology.

For abstract, see STAR 05 20.
N67-34033 HC$3.00 MF$0.65

A SOURCE ARRANGEMENT FOR A LOW-EXPOSURE-RATE TOTAL-BODY IRRADIATION FACILITY FOR MAN.
Oak Ridge Associated Universities, Tenn.
R. Cloutier, and P. Dalton. May 67, 211p NASA-CR-87798, ORINS-52
Contract AT/40-1/-GEN-33
Sponsored By Nasa

Descriptors: *Aerospace medicine, *Cobalt 60, *Radiation source, Aerospace, Calculation, Dimension, Facility, Man, Medicine, Multiple, Numerical, Radiation, Room, Single, Source, Table.

For abstract, see STAR 05 20.
N67-35130 HC$3.00 MF$0.65

6C. Biology

THE SUBHUMAN PRIMATE: A GUIDE FOR THE VETERINARIAN,
Edgewood Arsenal Md
Robert A. Whitney, Donald J. Johnson, and William C. Cole. Jun 67, 107p Rept no. EA-SP-100-26

Descriptors: (*Primates, Veterinary medicine), (*Laboratory animals, Primates), Procurement, Housing, Maintenance, Hygiene, Medical laboratories, Standards, Safety, Anesthesia, Nutrition, Deficiency diseases, Vitamins, Infectious diseases, Parasitic diseases, Classification, Monkeys.

The regulations and standards of the Laboratory Animal Welfare Act, PL 89-544, require programs of disease control and prevention, euthanasia, and adequate veterinary care maintained under the supervision of a Doctor of Veterinary Medicine in research facilities that use subhuman primates, as well as dogs and cats. This guide is an attempt to provide the veterinarian with a broad familiarity with procurement, housing and care, techniques, nutrition, infectious diseases, and classification of subhuman primates and to provide references for more detailed requirements in specific areas. (Author)
AD-657 570 HC$3.00 MF$0.65

ANIMAL PSYCHOPHYSICS: AN EXAMINATION OF THE FIELD.
Washington Univ Seattle Psychophysics Lab
For primary bibliographic entry see Field 5J.
AD-657 626 HC$3.00 MF$0.65

EFFECT OF APHOLATE AND METEPA ON AEDES AEGYPTI INFECTED WITH VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
Fort Detrick Frederick Md
For primary bibliographic entry see Field 6F.
AD-657 689 Not available from CFSTI.

MECHANISMS OF RESISTANCE OF POIKILOTHERMIC ANIMALS TO SUBFREEZING TEMPERATURES,
Naval Medical Research Inst Bethesda Md
Harold T. Meryman. Sep 67, 7p
Availability: Published in The Cell and Environmental Temperature p113-7 1967.

Descriptors: (*Freezing, Resistance (Biological)), Wounds + injuries, Tissues (Biology), Insects, Tolerances (Physiology), Ice, Dehydration, Mollusca, Metabolism, Erythrocytes, Frostbite, Cells (Biology).

The various theories for the mechanism of freezing injury and resistance to freezing on the part of poikilotherms are discussed. It is concluded that no proposed mechanism appears to be compatible with all experimental observations and that there are undoubtedly several routes by which freezing can injure. The particular mechanism which leads to cell death depends on the organism itself. (Author)
AD-657 826 Not available from CFSTI.

USE OF GERMFREE ANIMALS IN THE STUDY OF DENTAL CARIES.
Chicago Univ Ill Zoller Memorial Dental Clinic
For primary bibliographic entry see Field 6E.
AD-657 859 Not available from CFSTI.

ON SOME COCOONS BELONGING TO UNDESCRIBED SPECIES OF ENDOPARASITIC TURBELLARIANS,
Copenhagen Univ Helsingoer (Denmark) Marine Biological Lab
Aago Moeller Christensen, and Birgitte Kanneworff. 1967, 15p
Availability: Published in Ophelia v4 p29-42 Jul 1967.

Descriptors: (*Platyhelminths, Life cycle), Reproduction (Physiology), Parasites, Marine biology, Distribution, Morphology (Biology), Denmark.
Identifiers: Cocoons.

Six different types of cocoons, belonging to as many unknown species of endoparasitic turbellarians of the family Fecampiidae, are figured and described. All types exhibit many characteristics in common with the cocoons constructed by animals of the genus Kronborgia Christensen and Kanneworff to which many - if not all - of the unknown species probably belong. Based on the finding localities it is concluded that the Fecampiidae have a worldwide distribution in cold as well as warm waters. It is also indicated that considerably more than six species remain to be discovered and described. (Author)
AD-657 882 Not available from CFSTI.

PRELIMINARY STUDIES ON FASCIOLOPSIS BUSKI (LANKESTER, 1857) (GIANT ASIAN INTESTINAL FLUKE) IN THE UNITED STATES,
Naval Medical Research Unit No 2 Taipei (Taiwan) Dept of Biochemistry
Robert E. Kuntz, and Chin-Tsong Lo. 1967, 7p
Rept no. NAMRU-2-TR-289
Availability: Published in Trans Amer Microsc Soc v86 n2 p163-6 1967.

Descriptors: (*Platyhelminths, Life cycle), Laboratory animals, Parasitic diseases, Intestines, Gastropoda, Swine, Rabbits, Monkeys, Infections.

With the importation of living materials from Taiwan, Republic of China, the life cycle of Fasciolopsis buski (Lankester, 1857), the giant intestinal fluke of Asia, is currently being maintained in the United States. The snail host, Segmentina hemisphaerula (Benson, 1842) may be cultured with moderate ease and pigs may be employed as definitive hosts. Preliminary susceptibility studies have indicated that most commonly used laboratory animals cannot be infected but the parasite may establish itself temporarily in rabbits or squirrel monkeys (Saimiri sciureus petrinus Thomas, 1927). (Author)
AD-657 886 Not available from CFSTI.

LIFE IN THE UNIVERSE,
Rand Corp Santa Monica Calif
S. H. Dole. Sep 67, 21p Rept no. P-3669
Prepared for presentation at the Hawthorne School, Beverly Hills, California, July 28, 1967 to Students Attending an Aerospace Science Course.

Descriptors: (*Space biology, *Solar systems), (*Planetary atmospheres, Chemical elements), Stars, Sun, Planets, Galaxies, Astronomy, Water, Carbon compounds.

If life will appear whenever the conditions are tolerable, as stated by many modern scientists, and if there are numerous planets in the right mass rang orbiting at the proper distance around suitable stars, then life must be quite common. Assuming here that the word life, wherever it appears, implies life based on water and on carbon compounds, that is, life 'as-we-know-it' and as found on the surface of the earth. There are some very good arguments in support of this. Another argument depends on the very unusual properties of water and of the compounds of carbon. Water is an amazing material--there is no other compound that comes close to it in many of its properties. Similarly, no other element but carbon has the property of being able to form such an enormous variety of complicated long-chain compounds--as are demanded by life processes. Something like half-a-million compounds of carbon have been identified--which is perhaps 50 times as many as all the chemical compounds that do not contain carbon.
AD-658 009 HC$3.00 MF$0.65

HEMATOLOGY OF THE MONKEY (MACACA MULATTA),
Scientific rept.,
Armed Forces Radiobiology Research Inst Bethesda Md
R. E. Stanley, and M. B. Cramer. Dec 66, 37p
Rept no. AFRRI-SR66-1

Descriptors: (*Monkeys, *Hematology), Males, Females, Erythrocytes, Hemoglobin, Hematocrit,

Blood counts, Leukocytes, Blood platelets, Lymphocytes, Blood coagulation, Sex, Aging (Physiology), Blood analysis.

Base line hematological values were determined for 79 male and 62 female monkeys (Macaca mulatta). One group of 5 males and 6 females over 3 years of age was sampled weekly for 40 weeks. A second group of 130 monkeys was subdivided according to sex and age: males vs females, under 3 years of age vs over 3 years of age. These animals were sampled biweekly for 12 weeks. Age- and sex-related influences on the various parameters were evaluated. In the first group, the males' red cell count, hemoglobin, and hematocrit were significantly higher ($p < .001$) than the corresponding values for females. In females the white cell count, platelet count and erythrocyte sedimentation rate were significantly higher ($.05 > P > .01$) than in males. In the second group, sex-related differences were seen in both age categories. Males under 3 years had significantly higher ($p < .01$) hemoglobin, hematocrit, lymphocyte and clotting time values than females of the same age group. In females under 3 years, the segmented neutrophil value was higher ($p < .01$) than in males under 3 years. In the animals over 3 years of age, males had higher values for red cell count, hemoglobin, hematocrit, lymphocyte, clotting time (all $p < .01$) and white cell count ($.05 > p > .01$). As in the younger age group, the segmented neutrophil value was higher ($p < .01$) in females. Three age-related differences were found. Males over 3 years had a higher red cell count ($.05 > p > .01$) but a lower hemoglobin ($p < .01$) than males under 3 years. Females under 3 years had a higher white cell count ($p < .01$) than the older females. (Author)
AD-658 021 HC$3.00 MF$0.65

SECONDARY EVALUATION OF POTENTIAL ANTIMALARIAL AGENTS.
IIT Research Inst Chicago Ill Technology Center
For primary bibliographic entry see Field 6O.
AD-658 234 HC$3.00 MF$0.65

SYNTHESIZING THE WAVEFORMS OF BAT'S PULSES,
King'S Coll London (England) Dept of Zoology
J. D. Pye. Sep 66, 26p
AFOSR-67-2124
Contract AF 61 (052)-876
Availability: Published in Les Systemes Sonars Animaux Biologie et Bionique Frascati (Italy) Sep 1966.

Descriptors: (*Bats, Ultrasonic radiation), Harmonic analysis, Waveform generators, Recording systems, Information theory, Acoustics, Sound signals, Pulse systems, Resonance, Echo ranging, Analog systems, Models (Simulations), Great Britain.

Oscillographic displays of the orientation signals of bats show wide variation, from a 'sine-wave' to a complex waveform. A simple electrical model and oscillographic/spectrographic analyses of the pulses recorded from over 60 species of 13 families show that all wave-forms can be derived from a pulsed glottal waveform by vocal-tract resonance. This mechanism resembles that of human vowel production but involves only one format, relatively low in the harmonic series. Further influences may be introduced by facial appendages, atmospheric velocity-dispersion and the intrusion of echoes when recording. The combined theory adequately explains the time-course of harmonic components, their complicated phase-shifts, different envelope shapes including 'hour glass' and 'terminal peak' patterns and two distinct amplitude modulation effects. It also produces the surprising results that drastic changes between adjacent pulses are more apparent than real, that some high-frequency bats emit 'pure' harmonics and that others are easily rendered audible. Further work involves measuring the predicted properties of passive components in the system, elucidating the newly defined laryngeal function and examining the implications for echo-information theory. (Author)
AD-658 277 Not available from CFSTI.

A METHOD FOR ESTRICTING STIMULI TO THE FRONTAL OR LATERAL VISUAL FIELD OF EACH EYE SEPARATELY IN PIGEON,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
Nancy K. Mello. 1967, 3p
AFOSR-67-2112
Grants AF-AFOSR-544-65, PHS-NB-05004
Availability: Published in Psychon Sci v8 n1 p15-6 1967.

Descriptors: (*Vision, Inhibition), (*Pigeons, Vision), Behavior, Effectiveness, Eyeglasses, Optical filters.

A method of restricting visual stimuli either to the frontal or to the lateral visual field in pigeons, using goggles and colored filters is described. This technique permits the sequential or simultaneous presentation of discriminative stimuli to each eye separately for the study of inter-hemispheric transfer of visual information. Behavioral data are presented to demonstrate the adequacy of the method. (Author)
AD-658 279 Not available from CFSTI.

INTER-HEMISPHERIC COMPARISON OF VISUAL STIMULI IN THE PIGEON,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
Nancy K. Mello. 1967, 3p
AFOSR-67-2139
Grant AF-AFOSR-544-65
Availability: Published in Nature v214 n5084 p144-5 Apr 8 1967.

Descriptors: (*Pigeons, Vision), Responses, Eye, Visual perception, Space perception.

Monocularly trained pigeons show inter-hemispheric reversal of left-right mirror images. This cannot be explained by binocular 'confusion.' Pigeons were monocularly trained to discriminate between crossed lines and parallel oblique lines. The response in binocular viewing conditions showed that pigeons do not confuse crossed and oblique lines when each line is simultaneouly presented to opposite eyes. (Author)
AD-658 280 Not available from CFSTI.

BERING LAND BRIDGE: EVIDENCE OF SPRUCE IN LATE-WISCONSIN TIMES.
Technical rept.,
Arctic Inst of North America Washington D C
Paul A. Colinvaux. 11 Jan 67, 5p
Contract Nonr-3996 (01)
Prepared in cooperation with Ohio State Univ., Columbus, Dept. of Zoology and Entomology.
Availability: Published in Science v156 n3773 p38-03 Apr 21 1967.

Descriptors: (*Trees, Alaska), (*Bering sea, Bridges), Geologic age determination, Lakes, Arctic regions, Sedimentary rock, Glaciers.
Identifiers: Core sampling.

A 14-meter core from a crater lake on Saint Paul Island in the Pribilofs has been examined by pollen analysis. Radiocarbon dating indicates that the core spans more than 10,000 years and probably more than 18,000 years. A spruce-pollen maximum about 10,000 years ago suggests that spruce advanced to the flanks of the southern coast of the Bering land bridge toward the close of the land-bridge period. The forests of Alaska and Siberia did not merge, however, and the environment of the southern coast of the land bridge remained cold. (Author)
AD-658 298 Not available from CFSTI.

TURBELLARIA OF NORTHERN ALASKA AND NORTHWESTERN CANADA.
Technical rept.,
Arctic Inst of North America Washington D C
Charlotte Holmquist. 1967, 18p
Contract Nonr-3996 (01)
Prepared in cooperation with Naturchistoriska Riksmuseet, Stockholm (Sweden).
Availability: Published in Int. Revue ges Hydrobiol v52 n1 p123-39 1967.

Descriptors: (*Platyhelminths, Arctic regions), Alaska, Canada, Chromosomes, Morphology (Biology), Classification, Aquatic animals.

Five species of turbellarians are recorded for northwestern arctic to subarctic America, all of which belong to different genera, viz. Castrada spinulosa Hofsten 1907, Mesostoma lingua (ABILDGAARD) 1789, Gyratrix hermaphroditus EHRENBERG 1831, Otomesostoma auditivum (FOREL + DU PLESSIS) 1874, and Dendrocoelopsis piriformis KENK 1953. Only the last-mentioned, a triclad, was earlier reported from the area. Mesostoma arctica HYMAN 1938 has been recorded from northern Manitoba, Canada; it is now suggested to be a synonym of Mesostoma lingua. Castrada spinulosa was hitherto known only from a few localities in Europe. Chromosomal studies showed a probable number of $2n=6$ for Castrada spinulosa, a number of $2n=8$ for Mesostoma lingua and for Otomesostoma auditivum a number of approximately $2n=20$. Dendrocoelopsis piriformis was considered in a previous paper,and no material of Gyratrix hermaphroditus was available for such studies. The results of may investigations in northern Alaska and northwestern Canada in the summers of 1961, 1963 and 1964 emphasize how little is known about the turbellarian fauna of arctic to subarctic areas. (Author)
AD-658 300 Not available from CFSTI.

MANAYUNKIA SPECIOSA LEIDY - A FRESH-WATER POLYCHAETE FOUND IN NORTHERN ALASKA,
Arctic Inst of North America Washington D C
Charlotte Holmquist. 3 Mar 66, 11p
Contract Nonr-3996 (01)
Availability: Published in HYDROBIOLOGICA, Acta Hydrobiologica Hydrographica et Protistologica v29 n3/4 p297-304 1967.

Descriptors: (*Annelida, Alaska), Lakes, Morphology (Biology), Classification, Aquatic animals.

Two new localities are reported for the fresh-water polychaete worm Manayunkia speciosa. Details of the two lakes from the investigations in the summers of 1961, 1963 and 1964 are given. A short summing up of the various Manayunkia species is presented, viz. M. speciosa Leidy 1858, M. aestuarina (Bourne) 1883, M. baicalensis (Nusbaum) 1901, M. caspica Annenkova 1920, and M. brasiliensis Banse 1956. The opinion of Zenkevich (1935) and Kozhov (1963) that the genus may be rather old is accepted, but it is emphasized that other theories must rest, until much more is known about the various species. (Author)
AD-658 304 Not available from CFSTI.

SPECTRAL SENSITIVITY OF THE SOOTY MANGABEY.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
Calvin K. Adams, and Arthur E. Jones. 19 Jun 67, 15p Rept no. USAMRL-737

Descriptors: (*Monkeys, *Vision), (*Color vision, Humans), Photosensitivity (Biological), Spectra (Visible + ultraviolet).

Purkinje shift and scotopic and photopic spectral sensitivity functions were determined for four Sooty mangabeys and five human controls using a flicker technique in a 4-choice discrete trials

task. Results indicate a Purkinje shift similar in magnitude and frequency locus to that of human controls. Scotopic spectral sensitivity was almost identical to that of human controls, although both species showed reduced sensitivity relative to the standard CIE function, at short wavelengths. Photopic spectral sensitivity disclosed enhanced sensitivity in the blue and reduced sensitivity (0.3 - 0.4 log units) in the red relative to human controls. (Author)
AD-658 399 HC$3.00 MF$0.65

ESTABLISHMENT OF THE MARSUPIAL AS A LABORATORY ANIMAL.
Rept. for 1 Sep-31 Dec 66.
California Univ., Davis. Dept. of Anatomy and Experimental Animal Resources.
1966, 21p
Contract PH-43-65-623

Descriptors: (*Mammals, *Laboratory animals), Procurement, Reproduction (Physiology), Mortality rates, Radiation effects, Nutrition.
Identifiers: Marsupials.

Areas of activity discussed include: Colony status; procurement of species; colony management; reproduction; mortality; and response to 200r X-irradiation.
PB-175 724 HC$3.00 MF$0.65

6D. Bionics

UNSUPERVISED LEARNING, MINIMUM RISK ADAPTIVE PATTERN CLASSIFICATION.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9B.
AD-657 759 HC$3.00 MF$0.65

CYBERNETICS AND EDUCATION,
System Research Ltd Richmond (England)
For primary bibliographic entry see Field 5I.
AD-657 806 HC$3.00 MF$0.65

RANDOM STORE AND FORWARD COMMUNICATION NETWORKS WITH APPLICATIONS TO PATTERN RECOGNITION,
Columbia Univ Dobbs Ferry N Y Hudson Labs
For primary bibliographic entry see Field 9D.
AD-658 136 HC$3.00 MF$0.65

THEORY AND APPLICATIONS OF IMICTRON - A CONTROL ELEMENT HAVING MECHANISMS OF A LIVING NEURON.
Tokyo Univ. (Japan). Inst. of Industrial Science.
S. Aida. Mar 67, 93p
Its Vol. 17, No. 5, Serial No. 112

Descriptors: *Coding system, *Control simulator, *Logic circuit, *Neuron, *Pulse modulation, Circuit, Coding, Control, Element, Feedback, Input, Interval, Logic, Mechanism, Modulation, Network, Noise, Pattern, Physiology, Pulse, Recognition, Simulator, System, Time.

For abstract, see STAR 05 20.
N67-34186 HC$3.00 MF$0.65

NEURONAL OSCILLATORS.
Imperial Coll. of Science and Technology, London (England). Electrical Engineering Dept.
J. D. Cowan. Jan 67, 32p AD-653893
Contract N62558-4256

Descriptors: *Mathematical model, *Nervous system, *Oscillator, Behavior, Bionics, Brain, Cell, Data, Experiment, Impulse, Information, Mathematics, Model, Nerve, Nervous, Neurology, Physiology, System, Theory.

For abstract, see STAR 05 20.
N67-34497 HC$3.00 MF$0.65

OPTIMUM FINITE SEQUENTIAL PATTERN RECOGNITION,
Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
For primary bibliographic entry see Field 9B.
PB-175 690 HC$3.00 MF$0.65

6E. Clinical Medicine

ORAL HEALTH OF OPERATING FLEET BALLISTIC MISSILE SUBMARINE CREWS: A CROSS-SECTIONAL SURVEY.
Memorandum rept.,
Naval Submarine Medical Center Groton Conn Submarine Medical Research Lab
William R. Shiller. 25 Jul 67, 11p Rept no. SMRL-MR-67-6

Descriptors: (*Submarine personnel, Dentistry), Hygiene, Mouth, Military medicine, Teeth, Confined environments.

A cross-sectional survey of two fleet ballistic missile submarine crews revealed no remarkable oral health factors. A close relationship was found between oral hygiene levels and periodontal health. The personal oral hygiene of the FBM submariner was found to be better than that of other submarine groups studied. About 12 per cent of the men were found to be in need of early dental care just prior to patrol. It is concluded that no adverse effects of FBM submarine service on oral health could be demonstrated; however, in view of the isolated nature of the FBM patrols great stress needs to be placed on personal oral hygiene and regular professional dental care. (Author)
AD-657 546 HC$3.00 MF$0.65

A LONGITUDINAL STUDY OF LIFE-CHANGE AND ILLNESS PATTERNS,
Navy Medical Neuropsychiatric Research Unit San Diego Calif
Richard H. Rahe, Joseph D. McKean, Jr., and Ransom J. Arthur. 20 Dec 66, 15p Rept no. 67-1
Availability: Published in Journal of Psychosomatic Research v10 p355-66 1967.

Descriptors: (*Abnormal psychology, Military personnel), (*Military medicine, *Adjustment (Psychology)), Psychiatry, Stress (Psychology), Reaction (Psychology), Behavior, Physical fitness, Naval personnel, Military psychology, Diseases, Neuroses, Psychoses, Psychophysiology.
Identifiers: Psychosomatic disorders.

The health records of 50 Navy and Marine personnel, who were ultimately disabled and separated from the service for psychiatric illness, were selected at random to study several parameters of life-change and illness patterns. A longitudinal analysis of their total illness experience was made and the results compared to previous documentation of illness patterns of American working men. A similar analysis was made of all changes in a subject's life pattern which were recorded in his health record or in his psychiatric social history. Each year of active duty was analysed for these life changes, they were scaled and then summed; the same was done for yearly illness experience. Both life-changes and illnesses were seen to cluster during certain years. In general, a cluster-year of life-changes was seen to occur immediately prior to an illness or to a clustering of illnesses. The more severe illnesses were preceded by cluster-years of higher life change magnitude than years prior to minor illnesses. Two instances of death and one instance of near-death were preceded by clusterings of high life-change magnitude. (Author)
AD-657 550 Not available from CFSTI.

THE EFFECTS OF SEQUENTIAL BUFFERING, EXTRACELLULAR FLUID REPLACEMENT, AND HEMODILUTION IN HEMORRHAGIC SHOCK,
Pennsylvania Univ Philadelphia Harrison Dept of Surgical Research
Eugene T. Tragus, Willia y M. Parkins, and Arthur E. Baue. 28 Nov 66, 7p
Contract DA-49-193-MD-2535
Availability: Published in Surgery v61 n5 p795-801 May 1967.

Descriptors: (*Shock (Pathology), Therapy), Acidosis, Body fluids, Dextran, Blood volume, Survival, Sodium compounds, Carbonates, Sodium chloride.

Sequential correction of acidosis with NaHCO3, increase in extracellular fluid volume by NaCl, and hemodilution with clinical dextran delayed the time when blood could be given in early shock and decreased the volume of blood required for survival but did not increase survival in animals predicted to be irreversible. A small increase in survival of animals after 90 minutes of shock was found when they were given these fluids and blood, as compared with blood alone. (Author)
AD-657 551 Not available from CFSTI.

EFFECTS OF INCREASED OSMOLALITY AND CORRECTION OF ACIDOSIS ON BLOOD FLOW AND OXYGEN CONSUMPTION IN HEMORRHAGIC SHOCK,
Pennsylvania Univ Philadelphia Harrison Dept of Surgical Research
Arthur E. Baue, Eugene T. Tragus, and William M. Parkins. 22 Aug 66, 9p
Contract DA-49-193-MD-2535
Availability: Published in Journal of Surgical Research v7 n8 p349-56 Aug 1967.

Descriptors: (*Shock (Pathology), Osmosis), Electrolytes (Physiology), Therapy, Effectiveness, Blood volume, Blood circulation, Oxygen consumption, Hemorrhage, Hematocrit, pH, Acidosis.

Hypertonic NaHCO3 or NaCl given to an animal in hemorrhagic shock with the blood pressure maintained at the shock level by an open reservoir produced marked increases in cardiac output and oxygen consumption. This occurred in spite of large volumes of blood which were removed to maintain the same low blood pressure and decreased arterial oxygen content. Hematocrit was greatly decreased, which would reduce blood viscosity, and plasma osmolality was increased. The increased survival rate and reduced tissue damage found in other studies with hypertonic infusions during hemorrhagic shock would seem to be the result of this hemodynamic improvement. Cellular overhydration may occur with shock, but because of changes in blood flow and oxygenation, experiments such as this yield no information about the possibility of its occurrence or reversal by increased osmolality. The hemodynamic and oxygenation changes with NaCl and NaHCO3 in hemorrhagic shock were comparable and indicate that the improvement after NaHCO3 was due to an osmotic effect rather than to pH correction. This suggests that circulatory depression by metabolic acidosis either was not present at the time and levels studied or could not be separated from the extensive osmotic effects of these solutions. (Author)
AD-657 552 Not available from CFSTI.

VIRAL HEPATITIS: ACUTE AND CONVALESCENT STUDIES.
Annual progress rept. 1 Jan-1 Aug 67,
University of Western Ontario London Dept of Chemistry
Allan G. Redeker. 1 Aug 67, 7p
Contract DA-49-193-MD-2377

Descriptors: (*Infectious hepatitis, Pathology), (*Hepatitis viruses, Diseases), Biopsy, Liver, Intestines, Therapy, Blood transfusions, Serum hepatitis, Convalescence, Blood analysis, Blood chemistry, Enzymes.

Studies were made of the acute and convalescent phases of viral hepatitis, both natural (IH) and post-transfusion (SH). These investigations emphasized needle biopsy of the liver, small bowel biopsy and L.E. cell ests. Eighteen cases of fulminant hepatitis with coma were studied. Six patients survived with conservative therapy. Three cases were treated by multiple exchange transfusion, all unsuccessfully. Convalescent (long term follow-up) studies disclosed a number of patients exhibiting a persistent lesion characterized by recurrent transaminase elevations and mild inflammation in the liver upon biopsy. One patient progressed within one year from acute hepatitis to advanced cirrhosis. (Author)

AD-657 632 HC$3.00 MF$0.65

THE EVALUATION OF VASOACTIVE AGENTS IN SHOCK WITH AND IN THE ABSENCE OF INTRAVENOUS FLUID THERAPY.

Annual progress rept. 1 Dec 66-1 Aug 67,
Pennsylvania Univ Philadelphia Harrison Dept of Surgical Research
Jonathan E. Rhoads. 1 Aug 67, 6p
Contract DA-49-193-MD-2535

Descriptors: (*Shock (Pathology), Therapy), (*Vasoactive agents, Shock (Pathology)), Chemoreceptors, Blood circulation, Metabolism, Survival, Hemorrhage, Dosage, Responses, Carbon dioxide, Oxygen consumption, Lactates, Lymph, Toxins + antitoxins, Septicemia, Ventilation, Corticosteroid agents, Arteries, Autonomic nervous system, Hypotension, Hypoxia, Parenteral infusions.

The report deals with the following areas of study related to vasoactive agents and fluid therapy in shock: (1) The effects of beta-adrenergic receptor stimulation on blood flow, oxidative metabolism and survival in hemorrhagic shock (dose--response relationships in differing circumstances, survival studies with continuous Isoproterenol infusion, oxygen consumption and excess lactate with Isoproterenol); (2) Hepato-splanchnic lymph production with hydrocortisone treated endotoxin shock; (3) The ventilatory response to hemorrhage (alterations in the response of ventilation to carbon dioxide, studies in awake animals, carotid sinus denervation and vagal-sympathetic trunk division); (4) Dynamic alterations in the volume of distribution of anions in hemorrhagic hypotension and hypoxemia; (5) The hemodynamic and metabolic effects of lactated Ringer's solution in hemorrhagic shock.

AD-657 673 HC$3.00 MF$0.65

STRUCTURAL STUDIES IN VIRAL HEPATITIS.

Progress rept. 1 Jul 66-31 Jul 67,
Mount Sinai Hospital New York
Hans Popper, Tibor Barka, Florenzo Paronetto, Emanuel Rubin, and Fenton Schaffner. 1 Aug 67, 12p
Contract DA-49-193-MD-2822

Descriptors: (*Hepatitis viruses, Diseases), (*Infectious hepatitis, Pathology), Electron microscopy, Liver, Necrosis, Morphology (Biology), Cytology, Primates, Immunity, Enzymes.

The investigations concerned, besides various consultation activity on projects on viral hepatitis, the conventional electron microscopic study of the hepatitis induced in marmosets by the demonstration of icterogenic serum. The hepatitis has some but not all hallmarks of human viral hepatitis. It differs particularly by the absence of cholestasis and lysosomal activation. However, so far unidentified bodies were noted in the cytoplasm, which are considerably smaller than ribosomes. Human viral hepatitis reveals fine structural changes related to reduced hepatic function, but no specific diagnostic criteria. Massive necrosis in viral hepatitis was closely investigated. Additional studies covering aspects of viral hepatitis included the pathogenesis of cholestasis, immunologic liver injury, morphologic characteristics for chronicity in liver injury and the manifestation of anabolic liver injury. (Author)

AD-657 674 HC$3.00 MF$0.65

GEOGRAPHIC NOTES ON THE BARBADOS MALARIA EPIDEMIC,

San Fernando Valley State Coll Northridge Calif
L. Schuyler Fonaroff. 1966. 10p
Contract Nonr-222 (11)
Prepared in cooperation with California Univ., Berkeley. Dept. of Geography, Contract Nonr-3656 (00).
Availability: Published in Professional Geographer v18 n3 p155-63 May 1966.

Descriptors: (*Plasmodium, Diseases), (*Epidemiology, *West Indies), Distribution, Etiology, Ecology, Population, Urban areas, Anopheles, Disease vectors, Soils, Terrain, Rainfall.

The Barbados malaria epidemic dynamically illustrates how a series of almost unrelated geographic situations have come together to make disease transmission possible. The original geomorphic aspect of the island, particularly soil characteristics and coastal topography, made the proliferation and maintenance of the mosquito vector, Anopheles albimanus, possible. Agricultural practices, when efficiently developed, are usually effective deterrents to malaria. Much of Barbados was in a high state of cultivation. The Bridgetown area, and adjoining portions of Christ Church parish experienced a development of tenantries replacing cultivated land. This situation provided an adequate environment for mosquito breeding. Lastly, the presence of man with a dormant reservoir of infection makes the entire cycle possible. It is assumed that laborers returning from malarious areas for at least seven years prior to the outbreak brought with them viable gametocytes. All that was missing was the insect which, after becoming infected during a blood feeding, transmits the disease to innumerable people. This insect, Anopheles albimanus, with a preference for the human environment, must have arrived on Barbados shortly before the fulminating phase of the first epidemic wave in the autumn of 1927. Its existence earlier, in all likelihood, would have precipitated infection sooner.

AD-657 691 Not available from CFSTI.

STUDIES ON LEVELS OF PENICILLAMINE-INDUCED CUPRIURESIS IN HETEROZYGOTES OF WILSON'S DISEASE,

Naval Medical Research Unit No 2 Taipei (Taiwan) Dept of Biochemistry
Jun-Bi Tu, and R. Quentin Blackwell. 1 Dec 66, 11p
NAMRU-2-TR-286
Availability: Published in Metabolism v16 n6 p507-13 1967.

Descriptors: (*Metabolic diseases, Genetics), (*Copper, Excretion), Anomalies, Urine, Penicillins, Amino acids, Ingestion (Physiology), Eye, Diseases, Taiwan.
Identifiers: Wilson's disease.

Ten heterozygotes for Wilson's disease, all parents of Wilson's disease patients, were compared with 10 Wilson's disease patients and 26 normal subjects for their respective 24-hour urinary copper excretions before and after 1 Gm. doses of penicillamine. The mean urinary copper excretion by the heterozygotes was significantly higher than that of the normal subjects and significantly lower than that of the homozygotes for the Wilson's disease. Differences were greater after penicillamine ingestion. Ranges for the normal subjects and the heterozygotes overlapped markedly thereby precluding any identification of heterozygotes. Heterozygotes and homozygotes for the disease had virtually separate ranges of urinary copper excretion after penicillamine ingestion. These results suggest a slight tendency for tissue copper accumulation in the heterozygote. Twenty-four hour urinary copper excretion after penicillamine ingestion coupled with total plasma copper level was found to distinguish heterozygotes from those homozygous for Wilson's disease. (Author)

AD-657 708 Not available from CFSTI.

COMPUTER ASSISTED ELECTROENCEPHALOGRAPHIC ANALYSIS OF CHICK PYRIDOXINE DEFICIENCY STATES.

Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Leon R. Pomeroy, and A. J. Welch. 15 Aug 67, 136p Rept no. TR-36
AFOSR-67-1890
Grant AF-AFOSR-766-67

Descriptors: (*Vitamin B complex, Deficiency diseases), (*Deficiency diseases, Electroencephalography), Implants, Electrodes, Computers, Diagnosis, Body weight, Behavior, Diet, Starvation, Models (Simulations), Brain, Chickens.

The hypothesis that computer-assisted, electroencephalographic (EEG) monitoring of control and Vitamin B6 (pyridoxine) deficient chicks could provide an analytical basis for the detection of pyridoxine insufficiency in advance of the symptomatic stages of this deficiency syndrome was tested in this research. The symptomatic criteria employed were weight differences between groups and behavioral hyperirritability. Daily weight records were kept on all chicks. The deficient subjects were placed on 98 per cent pyridoxine deficient chick ration. Dietary manipulation of pyridoxine deficiency status was carried out as follows: One group was pre-standardized on control ration and then transferred to deficient ration on day nine post-hatched. This group provided the basis for monitoring the EEG transition from optimal to insufficient pyridoxine nutrition, and was designated the Short Term Deficient (STD) group. Another group was placed on the same deficient ration on day one and provided the EEG correlates for the more chronic stages of this deficiency syndrome, and was designated the Long Term Deficient (LTD) group. On the seventh day symmetrical, gross, bipolar depth electrodes were implanted into the chick's cerebral lobe hyperstriatum. Post-operative healing was complete twenty-four hours later which permitted the initiation on day nine of daily EEG monitoring for the LTD and Control groups and monitoring every twelve hours for the STD group. The important electrographic finding was that of a significant, mean amplitude facilitation of short-latency for the STD chicks that occurred 24 hours after they had been transferred to the deficient ration. (Author)

AD-657 758 HC$3.00 MF$0.65

APPLICATION OF AUTOMATIC LITERATURE ANALYSIS TECHNIQUES TO PSYCHIATRIC INTERVIEWS,

Herner and Co Washington D C
Saul Herner, Henry A. Segal, and Edward Leyman. 2 Dec 66, 21p
AFOSR-67-2019
Contract AF 49 (638)-1424
Prepared in cooperation with Washington School of Psychiatry, D. C.

Descriptors: (*Psychiatry, Data processing systems), Automatic, Analysis, Diagnosis, Defense mechanisms (Psychology), Therapy.

The report describes an experiment in the application of Luhn's autoencoding and autoabstracting techniques to the analysis of the contents of psy-

chiatric interviews. Utilizing modification of the Luhn techniques, applied to a transcription of a recorded interview, the experiment produced a matrix of words ranked by frequency of occurrence and by frequency of combination with other words, and an extract consisting of ranked sentences containing the most frequently occurring words and combinations. A tentative evaluation by a panel of psychiatrists indicates that the matrix and extracts, as well as the simple word rankings upon which they are based, can produce clear insights regarding range of affect, mechanisms of defense, object relations, symptoms, history, and expectations from treatment. (Author)
AD-657 789 HC$3.00 MF$0.65

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS: PERFORMANCE AND CARDIOVASCULAR EVALUATION,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6S.
AD-657 827 Not available from CFSTI.

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS (10 DAYS),
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6S.
AD-657 828 Not available from CFSTI.

CYANOACRYLATE ADHESIVE AND HEMOSTASIS,
Walter Reed Army Inst of Research Washington D C
Teruo Matsumoto, Robert M. Hardaway, Charles A. Heisterkamp, Fred Leonard, and Peter M. Margetis. 20 Dec 66, 3p
Availability: Published in Archives of Surgery v94 p858-60 Jun 1967.

Descriptors: (*Surgical techniques, Adhesives), (*Adhesives, *Acrylic resins), Tissues (Biology), Wounds + injuries, Effectiveness.
Identifiers: Polycyanoacrylates.

Efficacy of immediate hemostasis in wound of solid organs was compared using various N-alkyl-alpha-cyanoacrylate tissue adhesives. Methyl-2-cyanoacrylates and lower homologous cyanoacrylates were not acceptable in our study for immediate hemostasis of injured solid organs except in some situations. Among the higher homologous monomers, N-butyl, isobutyl, and the monomer mixture of 95% heptyl and 5% methyl cyanoacrylate were proved to be most effective. (Author)
AD-657 830 Not available from CFSTI.

PRELIMINARY REPORT ON SOLUBLE ANTIGEN FLUORESCENT ANTIBODY TECHNIQUE FOR IDENTIFICATION OF HOST SOURCE OF MOSQUITO BLOOD MEALS,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6A.
AD-657 831 Not available from CFSTI.

GASTRIC SHIGELLOSIS IN RHESUS MONKEYS,
Walter Reed Army Inst of Research Washington D C
Thomas H. Kent, Samuel B. Formal, E. H. LaBrec, H. Sprinz, and Ronald M. Maenza. 11 Apr 67, 9p
Availability: Published in American Journal of Pathology v51 n2 p259-67 Aug 1967.

Descriptors: (*Shigella, *Digestive system diseases), (*Stomach, Pathology), Diseases, Monkeys, Histology, Fluorescent antibody techniques, pH.

Twenty rhesus monkeys were fed virulent Shigella flexneri organisms and the stomachs were examined at 2, 3, 4, 7, and 8 days after challenge. Grossly nearly half, and microscopically more than two-thirds of the animals had gastric lesions as early as 2 days post challenge. These lesions were most severe at 3-4 days, but persisted to 8 days. Of 20 animals, 16 had gastric lesions while 19 had the colonic lesions of shigellosis. In Giemsa-stained sections large bacilli were demonstrated in the lesions. The fluorescent antibody technique specifically identified these bacteria as shigella. Shigella flexneri was cultured from the stomachs of 13 of the 16 animals with gastric lesions. There appeared to be no relationship between pH of gastric contents and the occurrence of gastric lesions or the recovery of Shigella organisms from gastric contents. (Author)
AD-657 832 Not available from CFSTI.

DEGENERATION AND REGENERATION IN PERIPHERAL NERVE,
Walter Reed Army Inst of Research Washington D C
Ralph A. W. Lehman, and George J. Hayes. 1967, 17p
Availability: Published in Unidentified Journal 17p nd.

Descriptors: (*Surgical techniques, Nerves), (*Nerves, Regeneration), Degradation, Surgery, Nerve cells, Nerve fibers, Silicone plastics, Chimpanzees, Edema.

Neurorrhaphies with and without tubular cuffs of silicone rubber were performed in chimpanzees. The rate of degeneration in the zone of nerve severance and repair is much more rapid and of earlier onset than the Wallerian degeneration present in the distal portion of the nerve. Traumatic degeneration in the region of the anastomosis after conventional suture neurorrhaphy is characterized by tissue disarray, absence of the perineurium with loss of fascicular structure, and local swelling in the region of trauma. In the portion of the nerve distal to the anastomosis, swelling is absent and the fascicular architecture is preserved. Evidence is presented that these changes in the region of the anastomosis are in large part the result of the edema consequent upon nerve severance. Edema is therefore in large part responsible for the level to which degeneration extends in the proximal stump. The perineurium probably helps to limit the swelling of the nerve by edema. After nerve anastomosis, the perineurium degenerates for a short distance on both sides of the plane of severance. This permits swelling to proceed with little restriction. The result is disorientation of the tissues in the region of the anastomosis. When swelling is mechanically restricted by a rigid cuff all the changes of traumatic degeneration occur except that longitudinal tissue organization is retained. When a cuff is too tight, swelling will occur outside it. Degeneration and disorganization will be found in this area in spite of excellent tissue alignment beneath the cuff. The orderly regeneration of axons after entubulated neurorrhaphy is ascribed to limited compression of the swollen nerve. (Author)
AD-657 833 Not available from CFSTI.

DETERMINATION OF THE VIABILITY OF MUSCLE SOON AFTER WOUNDING,
Walter Reed Army Inst of Research Washington D C
Teruo Matsumoto, Robert M. Hardaway, and Charles A. Heisterkamp. 30 Nov 66, 3p
Report on Experimental Studies Using Local Dye for Delineation of Vital and Nonvital Muscle.
Availability: Published in Archives of Surgery v94 p794-7 Jun 1967.

Descriptors: (*Methylene blue, *Diagnostic agents), (*Muscles, Viability), Wounds + injuries, Dyes, Germicides, Therapy, Effectiveness, Biological stains.

Methylene blue, sprayed into the wound, stains nonviable muscle in a specific way, so that, in the experimental animal, nonviable tissue may be easily distinguished from viable tissue. (Author)
AD-657 835 Not available from CFSTI.

PRIMAQUINE SENSITIVITY IN CAUCASIANS: HEMOLYTIC REACTIONS INDUCED BY PRIMAQUINE IN G-6-PD DEFICIENT SUBJECTS.
Revised ed.,
Georgetown Univ Washington D C School of Medicine
James N. George, David A. Sears, Paul R. McCurdy, and Marcel E. Conrad. 2 Mar 67, 15p
Grant PHS-AM-09307
Revision of manuscript submitted 1 Nov 66. Research supported in part by Army Medical Research and Development Command, Dept. of the Army, Washington, D. C. Prepared in cooperation with Walter Reed Army Inst. of Research, Washington, D. C.
Availability: Published in The Journal of Laboratory and Clinical Medicine v70 n1 p80-93 Jul 1967.

Descriptors: (*Cinchona alkaloids, Hemolysis), (*Antimalarials, Hemolysis), Deficiency diseases, Oxidoreductases, Ingestion (Physiology), Sensitivity, Responses, Erythrocytes, Saccharide phosphates, In vivo analysis, Pharmacology.

The hemolytic reaction caused by the ingestion of the standard prophylactic antimalarial dose of primaquine was studied in 3 Caucasian males and 1 Negro male with G-6-PD deficiency. Each Caucasian subject came from an ethnic group in which primaquine sensitivity is uncommon (English, Sicilian, Ashkenazic Jewish). In contrast to the mild hemolytic reaction in the American Negro, destruction of about 20 per cent of circulating red cells occurred in each Caucasian subject. Hemolysis was similar in these individuals despite marked differences in clinical and laboratory studies. One subject had enzymatic studies similar to those observed in G-6-PD deficient Negroes; another had mild but significant hemolysis before the ingestion of primaquine; and the third failed to develop clinical jaundice because of accelerated plasma clearance of bilirubin. These studies suggest that the assay of G-6-PD in hemolysates and even the measurement of pentose phosphate shunt activity in intact red cells do not provide a basis for the prediction of the severity of primaquine sensitivity in vivo. (Author)
AD-657 836 Not available from CFSTI.

USE OF GERMFREE ANIMALS IN THE STUDY OF DENTAL CARIES.
Final technical rept. 1 Aug 62-31 Jul 65,
Chicago Univ Ill Zoller Memorial Dental Clinic
Frank J. Orland, Morris Wagner, and Virginia M. Carbonell. 7 Sep 67, 5p
Contract Nonr-2121 (05)
Prepared in cooperation with Notre Dame Univ., Ind.

Descriptors: (*Teeth, Diseases), (*Germ-free animals, Teeth), Dentistry, Diet, Streptococcus, Lactobacillus, Etiology, Rats.

Over the years, it has been possible to demonstrate that in the complete absence of all bacteria, germfree rats could not develop dental decay even though ingesting a caries-inducing diet for as long as 150 days when the early experiments were terminated. Later, in the presence of an enterococcus (Streptococcus sp) isolated from a rat in the external environment and with dental caries, otherwise germfree rats developed caries, though a longer time period was involved. Both in one early group of rats, as well as in several later groups of otherwise germfree rats inoculated with a lactobacillus strain, originally isolated from a human mouth with caries, dental caries did occur in some rats' molar teeth, but especially so in subsequent generations of rats living in such a lactobacillus environment. Inoculated leptotrichia-like filamentous bacteria

were difficult to establish and failed to induce caries in otherwise germfree (gnotobiotic) rats. Finally, in recently-observed animals maintained their life span on caries-inducing diets, no dental decay could be detected, thus conclusively demonstrating the etiological relationship of bacteria and dental caries in this kind of unique study. (Author)
AD-657 859 Not available from CFSTI.

ECTOPIC LACRIMAL GLAND TISSUE,
Armed Forces Inst of Pathology Washington D C
William R. Green, and Lorenz Zimmerman. 21 Apr 67, 11p
Availability: Published in Arch Opthal v78 p318-28 Sep 1967.

Descriptors: (*Eye, Pathology), Glands, Tissues (Biology), Cornea, Diseases, Ophthalmology.

All of the cases coded as aberrant or ectopic lacrimal gland at the Armed Forces Institute of Pathology were reexamined, and observations on 35 are reported. The cornea was involved in ten of the 18 cases in which the choristomatous tissue was present in the bulbar conjunctiva. Ectopic lacrimal gland tissue was present within the eye in one case and was felt to be the cause of a unilateral exophthalmos in eight cases in which the inflamed ectopically placed tissue was found deep in the orbit. Ectopic lacrimal gland tissue in the orbit was associated with a hamartomatous vascular lesion in two patients. (Author)
AD-657 876 Not available from CFSTI.

BENIGN PRIMARY HEMANGIOMA OF THE RIGHT ATRIUM OF THE HEART,
Armed Forces Inst of Pathology Washington D C Cardiovascular Pathology Branch
Giorgio Baroldi, F. Colombo, and William C. Manion. 1967, 4p
Availability: Published in Medical Annals of the District of Columbis v36 n5 p287-90 May 1967.

Descriptors: (*Heart, *Neoplasms), Cardiovascular system, Pathology, Etiology, Diagnosis, Histology, Liver.

A case of a benign interatrial septal angioma of the right atrium occurring in a 24-year-old man, associated with multiple angiomas of the liver, has been presented. Angiomas must be considered in the differential diagnosis of intracavitary tumors. (Author)
AD-657 877 Not available from CFSTI.

COLITIS CYSTICA PROFUNDA,
Armed Forces Inst of Pathology Washington D C
Donald M. Wayte, and Elson B. Helwig. 4 Nov 66, 11p
Availability: Published in American Journal of Clinical Pathology v48 n2 p159-69 Aug 1967.

Descriptors: (*Intestines, Pathology), Diseases, Glands, Mucus, Membranes (Biology), Cytology, Diagnosis, Neoplasms.
Identifiers: Rectum, Cysts.

Twenty-four patients with submucosal mucous cysts of the rectum and colon are described. Nineteen of the patients had the process confined to a distinct area within the rectum, whereas five patients had a more extensive distribution, which in two cases was associated with chronic ulcerative colitis. The relation of the cysts to inflammation within the colon and rectum is discussed; the authors consider that the submucosal cysts and glands found in this condition result from the extension of surface mucosa along granulation tissue tracts created through the muscularis mucosa. The differentiation from adenocarcinoma, and particularly the importance of careful cytologic evaluation, is stressed, in order to avoid a mistaken diagnosis of malignancy. (Author)
AD-657 878 Not available from CFSTI.

LASER INJURY IN SKIN,
Armed Forces Inst of Pathology Washington D C
James G. Kuhns, Jude Hayes, M. Stein, and Elson B. Helwig. 1967, 13p
Availability: Published in Laboratory Investigation v17 n1 p1-13 1967.

Descriptors: (*Lasers, *Wounds + injuries), Pathology, Swine, Skin, Organic pigments, Burns, Proteins, Thermal radiation, Enzymes, Tissues (Biology), Biological stains, Connective tissue, Vaporization, Thresholds (Physiology).

Acute lesions in porcine skin produced by non-Q-switched ruby laser irradiation were studied grossly and by means of a dissecting microscope, histologic and histochemical techniques, and high speed cinematography. Threshold doses of injury were established in pigmented and nonpigmented porcine skin. The lowest incident dose required to produce a minimal lesion of desiccation and scaling of the superficial epidermis with erythema in white pigs (in situ) was 40 Joule's equivalent per sq. cm. with a 2-millisecond pulse. A dose of only 2.2 Joule's equivalent per sq. cm. was required to produce a similar lesion in brown skin. More severe effects were observed in areas where the optical absorption was greatest, such as in the pigmented epidermis and hair follicles and intradermally injected pigment. These findings are in contrast to those for burns from other sources. The apparent sequence of events occurring in a severe laser lesion is the following: (1) absorption of the radiant energy and conversion to heat, with little conduction to adjacent tissue; (2) thermal denaturation of tissue proteins, as evidenced by a loss of enzyme activity and alteration in connective tissue staining; (3) explosive vaporization of tissue water; and (4) heating of tissue, with production of gas, carbonization, incandescence, and combustion. A rapid, convenient technique is described whereby the area of enzyme inactivation from thermal denaturation is clearly delineated in fresh gross tissue. (Author)
AD-657 880 Not available from CFSTI.

NASOPHARYNGEAL CARCINOMA AND ENVIRONMENTAL CARCINOGENS,
Naval Medical Research Unit No 2 Taipei (Taiwan) Dept of Biochemistry
J. W. Fresh, S. C. Sun, and J. W. Rampsch. 1967, 10p Rept no. NAMRU-2-TR-288
Availability: Published in UICC Monograph Series 1.20 10p nd.

Descriptors: (*Cancer, *Throat), Neoplasms, Etiology, Biopsy, Environment, Arsenic, Nickel, Chromium, Taiwan.

Nasopharyngeal biopsies were obtained from suspected cancer cases. The 83 patients with malignancies selected for study had lived at their present address at least 15 years. All of the cancers were differentiated or undifferentiated epidermoid carcinomas. More carcinomas were found in men than women in a ratio of almost 3 to 1. Seventy-eight of the patients were born on Taiwan. Of 8 patients with family histories of malignancies, 2 had family histories of nasopharyngeal carcinomas. Forty-nine patients were smokers of long duration (36% of the men and 17% of the women). About half of the patients' relatives had chronic pharyngitis. Elevated levels of arsenic were found in the hair and fingernails of 81% of the patients. Significant quantities of proven carcinogenic agents, arsenic, nickel and chromium, were found in the environmental dust, ashes, water and fuel of the patients' homes. The presence of these carcinogens may be possible predisposing factors for the production of carcinomas, especially nasopharyngeal carcinoma, in Chinese. (Author)
AD-657 894 Not available from CFSTI.

OUTER FIBER STRESSES IN LONG LEG BRACE UNDER STATIC LOAD.
Technical rept.,
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
John W. Hodge, Jr. Jul 67, 19p Rept no. TR-6705

Descriptors: (*Prosthetics, Stresses), Legs, Strain (Mechanics), Strain gages, Deflection, Loading (Mechanics).

An ischial weight-bearing brace was evaluated relative to stress and strain distributions under static conditions. Strain gages were bonded to the brace uprights in areas where it was assumed stresses would be highest and strain measurements made upon applying a load of 250 pounds in increments of 25 pounds. At the same time lateral deflection of each upright was observed. It was found that stress conditions to the extent of this evaluation were well within the allowable limits of the material used for fabrication of the brace. (Author)
AD-658 032 HC$3.00 MF$0.65

USAMBRL EXERCISE-TRACTION UNIT.
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
For primary bibliographic entry see Field 6L.
AD-658 033 HC$3.00 MF$0.65

INJURY EXPERIENCE IN ARMY HELICOPTER ACCIDENTS,
Army Board for Aviation Accident Research Fort Rucker Ala
For primary bibliographic entry see Field 1B.
AD-658 079 HC$3.00 MF$0.65

EXERTIONAL RHABDOMYOLYSIS IN NAVAL AVIATION OFFICER CANDIDATES,
Naval Aerospace Medical Inst Pensacola Fla
For primary bibliographic entry see Field 6N.
AD-658 312 HC$3.00 MF$0.65

THE INFLUENCE OF IRRADIATION ON NEISSERIA MENINGITIDIS L-FORM INFECTION IN MICE.
Mary Imogene Bassett Hospital, Cooperstown, N. Y.
For primary bibliographic entry see Field 6R.
AD-806 604 HC$3.00 MF$0.65

RICKETTSIAL DISEASES: A. TRENCH FEVER; B. EPIDEMIC TYPHUS.
Annual progress rept. 1 Feb 66-31 Jan 67,
Harvard School of Public Health, Boston, Mass.
Edward S. Murray, and J. William Vinson. Feb 67, 28p
Contract DA-49-193-MD-2111

Descriptors: (*Rickettsia, Diseases), Epidemiology, Ecology, Etiology, Disease vectors, Lice, Siphonaptera, Rats, Immunity, Vaccines, Serodiagnosis, Antigens + antibodies, Distribution, Equines, Guinea pigs, Infectious diseases, Public health.

Trench Fever: Synthetic Juvenile Hormone was lethal for body lice. CF antigens from R. quintana propagated on blood agar were used to establish etiology of cases of trench fever and to begin to determine the geographic distribution of the disease. An antigenic relationship may exist between R. quintana and Canadian Vole Agent. Two rickettsia-like agents were isolated from guinea pigs. Tests suggested that positive reactions of Mexican donkey sera to soluble typhus antigen were probably non-specific. The etiology of a small typhus epidemic in Mexico was serologically confirmed. Epidemic Typhus: Over the past 15 years studies have been carried out to determine the immune status of communities subjected over many years to epidemics of typhus. By means of a vaccine response test applied to sample groups of Bosnians in 1951, 1958 and 1966, it has been demonstrated that over 90% of the inhabitants born before 1941

were infected with typhus. Only an occasional infection has occurred in people born after the war. Residual typhus antibodies have been shown to be steadily declining. Positive Weil-Felix responses in the recrudescent Brill Zinsser disease cases were demonstrated to be more frequent as the interval between the primary and recrudescent attack widened. (Author)
AD-807 019 HC$3.00 MF$0.65

RESEARCH ON COMPOSITE SILICATE DENTAL CEMENTS.
Annual rept. 1 Jun 66-1 Jun 67,
Monsanto Research Corp., Everett, Mass. Boston Lab.
Thomas J. Rockett, and Carl A. Panza. 31 Jul 67, 92p MRB6027A1
Contract PH-43-66-889

Descriptors: (*Dentistry, Materials), (*Cements, Dentistry), (*Silicates, Dentistry), Teeth, Crystallography, PHASE STUDIES, Electron diffraction analysis, Calcium compounds, Phosphates, Alumina, Silicon dioxide, Solubility, Fracture (Mechanics).
Identifiers: Dental materials.

An eclectic theory based on observation is presented, which postulates that the worth of a silicate dental cement is a direct function of the properties of the micro-crystalline phases formed in the matrix during setting. Electron diffraction patterns of crystalline phases in the matrix are shown. The only crystalline phase in the cement matrix identified to date is portlandite Ca (OH)2. The chemical limits which determine setting properties for frits of CaO-Al2O3-SiO2 are presented. Cements of the ternary system CaO-Al2O3-P2O5-SiO2 are discussed. Several excellent frits can be prepared in the systems and some of the resultant cements have properties superior to commercially available cements. The glass 40% Ca3 (PO4)2 - 3O Al2O3 - 3O SiO2 was the best experimental material. Studies of the silicate cement surfaces show that cracks and pores formed during setting are the main sources of mechanical weakness. Methods of overcoming this problem are discussed.
PB-175 779 HC$3.00 MF$0.65

RESEARCH ON THE MECHANISM OF ADHESION TO TEETH.
Technical rept. 3 Feb 66-2 Mar 67,
Minnesota Mining and Mfg. Co., St. Paul. Central Research Labs.
Donald A. Pitt. May 67, 97p
Contract PH-43-65-15

Descriptors: (*Teeth, Adhesion), (*Dentistry, Materials), (*Plastics, Dentistry), Tissues (Biology), Surfaces, Bonding, Citric acids, Silver compounds, Nitrates, Morphology (Biology), Electron microscopy, Shear stresses.
Identifiers: Surface chemistry, Dental materials, Silver nitrate.

The adhesion of synthetic resins to dental tissue is strongly dependent on the moisture content of the tissue. The stability of the adhesion of candidate dental restorative materials in the presence of moisture was therefore studied through measurements of mechanical adhesion, surface energies, and morphological properties. The modification of dentin surfaces through treatment with two reagents, aqueous citric acid and silver nitrate solutions, provided enhancement of certain adhesive properties. These studies provide initial measurements of certain new aspects of dental surface chemistry. Through further elucidation of the mechanism of the interaction of dental substance with aqueous reagents, there is promise of true and permanent adhesion of synthetic polymers to natural tissues.
PB-175 780 HC$3.00 MF$0.65

EPOXY RESIN DENTAL MATERIALS.
Annual rept. 29 Apr 66-29 May 67,
Epoxylite Corp., South El Monte, Calif.
Henry L. Lee, Arthur L. Cupples, and Michael L. Swartz. 29 May 67, 160p RR-67-112
Contract PH-43-64-548

Descriptors: (*Dentistry, Materials), (*Epoxy plastics, Dentistry), Teeth, Adhesion, Polymers, O-heterocyclic compounds, Ethers, Polycyclic compounds, Aromatic compounds, N-heterocyclic compounds, Halogenated hydrocarbons, Curing agents, Amines, Acids, Thiols, Synthesis (Chemistry), Additives, Catalysts, Silanes, Reinforced plastics, Reinforcing materials, Whiskers (Crystals).
Identifiers: Dental materials, Surface chemistry.

The development of permanent, adhesive dental restorative materials based on epoxy resins is described. These studies involve the synthesis and evaluation of epoxy resins of six types; mononuclear glycidyl ether, polynuclear glycidyl ether, aromatic glycidyl, hydrogenated, triazine based, and fluorine-containing. In addition, new curing agents, special amines, Lewis acids and mercaptans are described. The continued evaluation of fillers, silane primers, diisocyanate accelerators and their effect on adhesion is also described. Clinical evaluation of filling resins developed to date are reviewed and the systems are outlined. A survey of whisker reinforcements for epoxy resins and dental amalgams is described. (Author)
PB-175 781 HC$3.00 MF$0.65

EFFECTS OF 5-FLUOROURACIL ON NORMAL SHEEP,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
UCRL-50242 HC$3.00 MF$0.65

6F. Environmental Biology

EFFECT OF APHOLATE AND METEPA ON AEDES AEGYPTI INFECTED WITH VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
Fort Detrick Frederick Md
Karl D. Kappus, and Edwin C. Corristan. 1967, 6p
Availability: Published in American Journal of Tropical Medicine and Hygiene v16 n4 p539-43 1967.

Descriptors: (*Aedes, *Insect control), Virus diseases, Disease vectors, Venezuelan equine encephalomyelitis virus, Reproduction (Physiology), Inhibition, Entomology, Viability, Eggs.
Identifiers: Chemosterilants.

Groups of Aedes aegypti female mosquitoes were fed 0.25 and 0.025% concentrations of apholate and metepa. Four days later they were fed a solution containing VEE virus and sweetened blood. Male mosquitoes were introduced also at this time. Treatment with the 0.25% concentrations of either sterilizing agent completely inhibited oviposition. Both the total number of eggs and the percentage of viable eggs in the groups treated with 0.025% concentrations were a fraction of those deposited by the untreated groups. Mortality in the treated vectors, especially those given the 0.25% concentrations, was higher than that in the untreated mosquitoes. The lower concentrations of sterilizing agents had no demonstrable effects on the susceptibility of the vectors to VEE virus or on subsequent transmission of the virus. Susceptibility to virus infection and the ability to transmit the disease were significantly influenced by the higher concentrations of both compounds. The results suggest that other mosquito vector-arbovirus combinations could demonstrate similar or increased potentials. (Author)
AD-657 689 Not available from CFSTI.

DISTRIBUTION OF COBALT 60, ZINC 65, STRONTIUM 85, AND CESIUM 137 IN A FRESH-WATER POND,
National Center for Radiological Health, Rockville, Md.
For primary bibliographic entry see Field 6R.
PB-175 707 HC$3.00 MF$0.65

6H. Food

FEDERATION OF MALAYA, NUTRITION SURVEY SEPTEMBER-OCTOBER 1962.
Interdepartmental Committee on Nutrition for National Defense Washington D C
For primary bibliographic entry see Field 6P.
AD-657 980 HC$3.00 MF$0.65

CONFERENCE ON RADIATION PRESERVATION OF FOOD, OAK RIDGE, TENNESSEE, FEBRUARY 2-3, 1967.
Southern Interstate Nuclear Board, Atlanta, Ga.
Jun 67, 100p
Prepared in cooperation with Oak Ridge Operations Office (AEC), Tenn.

Descriptors: (*Food, *Preservation), (*Irradiated foods, Costs), Meat, Military rations, Potatoes, Vegetables.

For abstract, see NSA 21 17.
CONF-670202 HC$3.00 MF$0.65

INVESTIGATION TO DETERMINE THE COMMERCIAL FEASIBILITY AND PRACTICALITY OF THE COMBINED ANION-CATION FIXED RESIN BED SYSTEM FOR THE REMOVAL OF RADIONUCLIDES FROM MILK.
Final rept. 1 Jun 65-30 Jun 66,
Producers Creamery Co., Springfield, Mo.
R. O. Marshall, E. M. Sparling, and B. H. Heinemann. 30 Jun 66, 208p
Contract PH-86-65-127

Descriptors: (*Milk, *Decontamination), (*Radioactive isotopes, Milk), Ion exchange, Feasibility studies, Pilot plants, Iodine, Strontium, Separation, Processing, Ion exchange resins, Industrial equipment.

Laboratory investigations conducted on bench scale equipment designed to simulate proposed modifications of the Lebanon, Missouri Sr-90 Removal Plant to provide for continuous removal of both I-131 and Sr-90 from fluid milk demonstrated the feasibility of the proposals. The existing plant was modified by integration of a Dowex 2X8 anion exchange resin column between the raw milk pre-heater and the citric acid injection system. Results of physical and chemical tests indicate physical and compositional changes in the milk parallel those found for the removal of Sr-90 alone. Radiological assays indicate that greater than 99 per cent I-131 removal was realized for in-vitro labeled milk. Average removal efficiencies for Sr-85 and Sr-90 were 94.6 and 90.0 per cent respectively. Average flavor score of the processed milk was 35.9, an average decrease of 1.45 points for the first two full scale runs. The major defect, described variously as 'chemical' or 'medicinal' was traced to the anion effluent milk. The data indicate the plant produced milk of acceptable quality at an estimated manufacturing cost of 6.3 cents per quart as compared to 2.3 cents per quart for Sr-90 removal alone. (Author)
PB-175 709 HC$3.00 MF$0.65

6I. Hygiene and Sanitation

ORAL HEALTH OF OPERATING FLEET BALLISTIC MISSILE SUBMARINE CREWS: A CROSS-SECTIONAL SURVEY.

Naval Submarine Medical Center Groton Conn Submarine Medical Research Lab
For primary bibliographic entry see Field 6E.
AD-657 546 HC$3.00 MF$0.65

MICROBIOLOGICAL LABORATORY HAZARD OF BEARDED MEN,
Fort Detrick Frederick Md
Manuel S. Barbeito, Charles T. Mathews, and Larry A. Taylor. 6 Mar 67, 8p
Availability: Published in Applied Microbiology v15 n4 p899-906 Jul 1967.

Descriptors: (*Medical technicians, Hygiene), Infectious diseases, Males, Hair, Hazards, Microorganisms, Toxins + antitoxins, Medical laboratories, Biological laboratories.

An investigation was conducted to evaluate the hypothesis that a bearded man subjects his family and friends to risk of infection if his beard is contaminated by infectious microorganisms while he is working in a microbiologucal laboratory. Bearded and unbearded men were tested with Serratia marcescens and Bacillus subtilis var. niger. Contact aerosol transmission from a contaminated beard on a mannequin to a suitable host was evaluated with both Newcastle disease virus and Clostridium botulinum toxin, type A. The experiments showed that beards retained microorganisms and toxin despite washing with soap and water. Although washing reduced the amount of virus or toxin, a sufficient amount remained to produce disease upon contact with a suitable host. (Author)
AD-657 696 Not available from CFSTI.

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
H. Schneider. 1966, 58p
Transl. Into English From Vdi (Ver. Deut. Ingr.) Z. (Dusseldorf) V. 26, No. 9, Sep. 1966

Descriptors: *Air pollution, *Dust collector, *Particle size, *Precipitation particle measurement, Aerosol, Air, Apparatus, Collector, Compound, Dust, Hydrogen, Industry, Lead, Measurement, Measuring, Odor, Oxide, Particle, Pollution, Precipitation, Size, Smell, Sulfide, Sulfur.

For abstract, see STAR 05 20.
N67-35081 HC$3.00 MF$0.65

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 13B.
For abstract, see STAR 05 20.
N67-35101 HC$3.00 MF$0.65

6J. Industrial (Occupational) Medicine

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 61.
For abstract, see STAR 05 20.
N67-35081 HC$3.00 MF$0.65

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 13B.
For abstract, see STAR 05 20.
N67-35101 HC$3.00 MF$0.65

6K. Life Support

THE BIOCHEMICAL PHYSIOLOGICAL AND METABOLIC EVALUATION OF HUMAN SUBJECTS IN A LIFE SUPPORT SYSTEMS EVALUATOR AND ON A DIET OF PRE-COOKED FREEZE DEHYDRATED FOODS.
Final rept. 12 Oct-24 Nov 64,
Miami Valley Hospital Dayton Ohio Dept of Research
Bernard J. Katchman, George M. Homer, James P. F. Murphy, and Dorathea P. Dunco. Jul 67, 57p
AMRL-TR-67-12
Contract AF 33 (657)-11716

Descriptors: (*Life support, Nutrition), Diet, Metabolism, Frozen foods, Dehydrated foods, Proteins, Carbohydrates, Fats, Ingestion (Physiology), Body weight, Acceptability, Pulse rate, Blood pressure, Body temperature, Confined environments, Space simulation chambers, Stress (Physiology).

A 6-week study with four college students as volunteer subjects was conducted for the purpose of evaluating the water, caloric, and protein requirements of individuals undergoing stresses imposed by simulated aerospace conditions. The subjects were confined in a controlled activity facility for 2 weeks and in the Life Support Systems Evaluator for 4 weeks during which time they wore an unpressurized MA-10 pressure suit 8 hours each day for 14 consecutive days. A 3-day cycle diet of pre-cooked freeze dehydrated foods was served at room temperature and was comprised of about 105 g of protein, 328 g of carbohydrate, 89 g of fat, and 2600 kcal per day. The daily requirement of water was 2200 ml per man day of which 700 ml were consumed ad libitum. The diet was highly acceptable and efficiently utilized. Only minimal body weight changes were observed. The nutrient intake of the diet was adequate in that a 70 kg man was maintained without any weight loss. Metabolic balances show excellent adjustment to the diet; all subjects were in positive balance for nitrogen and for the major inorganic constituents. All the clinical data including heart rate, blood pressure, and oral temperature were in the normal ranges and no significant differences were observed due to confinement in the Life Support Systems Evaluator. All subjects maintained excellent health throughout all the test periods. (Author)
AD-658 031 HC$3.00 MF$0.65

IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS.
Final rept. Nov 65-Feb 67,
Monsanto Research Corp Dayton Ohio Dayton Lab
J. V. Pustinger, Jr., and F. N. Hodgson. Jun 67, 212p
AMRL-TR-67-58
Contract AF 33 (615)-3377
Joint NASA/USAF rept. See also AD-642 054.

Descriptors: (*Spacecraft cabins, Materials), (*Controlled atmospheres, Analysis), Construction materials, Vapors, Gas chromatography, Mass spectroscopy, Oxidation, Hydrolysis, Carbon monoxide, Coatings, Adhesives, Plastics, Lubricants, Elastomers, Sealing compounds, Contamination.

Ninety-eight candidate materials for space cabin construction were tested to establish possible volatile gas-off and oxidation products. Test conditions were designed to simulate the normal space cabin environment. After pretreatment at 0.1 torr and at 25C, candidate materials were stored in bench-scale simulators for 14 days at 68C, and for 30, 60, and 90 days at 25C, in a 5 psia oxygen atmosphere with 20-40% relative humidity. Individual components of the volatile contaminants were identified and the quantities evolved were estimated by gas chromatographic and mass spectrometric analyses. In addition to the gas-off experiments, a cryogenic system for serial trapping of atmospheric contaminants was constructed. Gas chromatographic and mass spectrometric analyses were performed on four samples of atmospheres from bio-environmental systems. (Author)
AD-658 203 HC$3.00 MF$0.65

THE CLOSED LIFE-SUPPORT SYSTEM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
1967, 231p NASA-SP-134
Proc. of the Conf. on the Closed Life-support System, Held At Moffett Field, Calif., 14-15 Apr. 1966

Descriptors: *Conference, *Life support system, *Manned space flight, *Systems engineering, *Waste disposal, *Water purification, Algae, Carbohydrate, Closed ecological system, Culture (biol), Disposal, Engineering, Environmental control, Fat, Flight, Food, Life, Manned, Photosynthesis, Physiology, Protein, Purification, Regenerative cycle, Space, Support, System, Vitamin, Waste, Water.

For abstract, see STAR 05 20.
N67-34583 HC$3.00 MF$0.65

6L. Medical and Hospital Equipment

EVOKED POTENTIALS: THREE-DIMENSIONAL DISPLAY,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 6B.
AD-657 925 Not available from CFSTI.

USAMBRL EXERCISE-TRACTION UNIT.
Technical rept.,
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
Mary H. Yeakel, and Victor T. Riblett. Aug 67, 13p Rept no. TR-6708

Descriptors: (*Exercise, *Medical equipment), Therapy, Rehabilitation, Loading (Mechanics), Design.
Identifiers: Physical therapy, Occupational therapy.

The disadvantages of presently available traction systems and the equipment available for therapeutic exercise programs have been apparent for many years. To obviate their drawbacks a self-contained exercise-traction unit has been developed in which the force is obtained mechanically rather than from a dead weight load. The USAMBRL Exercise-Traction Unit provides a simple, efficient method of obtaining the forces needed for both traction and therapeutic exercise programs regardless of the location of the patient --- home, clinic, ward, or while in transit from one location to another. (Author)
AD-658 033 HC$3.00 MF$0.65

MOCK CIRCULATORY SYSTEM.
Final rept.
Hydrospace Research Corp., Rockville, Md.
15 Apr 67, 214p Rept. no. 152
Contract PH-43-64-78

Descriptors: (*Heart, *Mechanical organs), (*Blood circulation, Models (Simulations)), Instrumentation, Pathology, Hydraulic systems, Control systems, Design, Exercise, Anatomical models, Cardiovascular system, Nervous system, Digital computers.

A series of studies and tests resulted in the design of an Advanced Mock Circulatory System (AMCS) which is an accurate and precisely controllable hydraulic model of the human circulatory system. It contains both the systemic and pulmonary parts of the circulatory system, along with the interconnecting peripheral resistance networks. The AMCS is in the form of a closed hydraulic loop and is this capable of testing both ventricles at once. The AMCS is designed to be used as a tool to aid in the development of both artificial hearts with simulated neural control mechanisms as well as circulatory assist devices. The AMCS is also designed as a replacement for experimental animals during the early phases of artificial heart development. The advantage realized by replacing the living system and its unpredictable circulatory reactions by a hydraulic system with characteristics that accurately duplicate the animal is that controllable and reproducible test data are then possible. To achieve extreme flexibility and extended usefulness, the AMCS is under the direct control of a small digital computer. As an example of the flexibility thus realized by the AMCS, the system can be programmed to: (a) exercise the artificial heart by simulating various levels of exercise (b) measure control system reactions to programmed natural heart failures (testing curculatory assist devices), and (c) simulate various types of circulatory failures. (Author)
PB-175 719 HC$3.00 MF$0.65

6M. Microbiology

A SIMPLE, ALL-GLASS DEVICE FOR ISOLATING CLONES OF MAMMALIAN CELLS AND OF VIRUS,
Army Biological Labs Frederick Md
Louis E. Schneider. 3 Mar 67, 2p
Availability: Published in Applied Microbiology v15 n4 p959 Jul 1967.

Descriptors: (*Laboratory equipment, *Tissue culture), Tissue culture cells, Mammals, Viruses, Culture media, Microbiology.

Glass or plastic petri dishes are widely used for cloning mammalian cells. The method commonly involves plating an appreciable number of cells per dish, followed by the use of silicone-treated cylinders to isolate and retrieve selected clones. Although the technique is simple enough to perform, the many manipulations involved in maintenance and retrieval of the clones are time-consuming and conducive not only to extraneous contamination, but also to internal cross-contamination of the clones. These considerations led to the development of what is in effect a multichambered petri dish. The all-glass feature permits complete visualization on inverted microscopes, and the compact size renders manipulation easy on even the smallest microscope stage. In use, the vials are set with 1 or 2 ml of medium, theoretically containing one mammalian cell. According to the Poisson distribution of a single particle per unit volume, 37% of the vials would have no cells, 37% only one cell, and 26% more than one cell. The cells are allowed to propagate for 2 weeks without change of medium, at which time the clones are quite obvious and vials with more than one clone are easily eliminated. The selected single clones then can be transferred conveniently to T-15 or T-30 flasks as the next stage in line build-up. (Author)
AD-657 687 Not available from CFSTI.

YEAST SPORULATION ON TWO COMMONLY AVAILABLE MEDIA,
Fort Detrick Frederick Md
Warren P. Iverson. 3 Apr 67, 3p
Availability: Published in Applied Microbiology v15 n4 p966-7 Jul 1967.

Descriptors: (*Yeasts, Culture media), (*Spores, *Culture media), Preparation, Microbiology, Effectiveness.

In attempting to produce sporulation in some yeast strains, it was found that Trypticase Soy Broth (TSB; BBL) plus agar (1.5%) and Nutrient Agar (NA; BBL) induced fair to good sporulation of commercial bakers' yeast in 3 days, after two or three necessary transfers on a presporulation medium (Malt Extract Agar; Difco). In a study to determine the usefulness of these two media for sporulation, 12 yeasts which sporulated with difficulty were obtained. These yeasts plus a commercial bakers' yeast and a Saccharomyces strain (102), isolated in 1923 from the soil, were compared for sporulation on the two media indicated above, carrot slices, McKelvey's agar (C. E. McKelvey, J. Bacteriol. 11:98, 1926) and V-8 juice-agar (L. J. Wickerham, J. Bacteriol. 52:611, 1946). No one medium was successful in producing sporulation of all the strains. The greatest number (six) of yeasts sporulated on V-8 juice-agar; the same number sporulated on McKelvey's, TSB, and NA (five each).
AD-657 688 Not available from CFSTI.

EFFECT OF APHOLATE AND METEPA ON AEDES AEGYPTI INFECTED WITH VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
Fort Detrick Frederick Md
For primary bibliographic entry see Field 6F.
AD-657 689 Not available from CFSTI.

PESTICINS. III. EXPRESSION OF COAGULASE AND MECHANISM OF FIBRINOLYSIS,
Fort Detrick Frederick Md
E. D. Beesley, R. R. Brubaker, W. A. Janssen, and M. J. Surgalla. 4 Mar 67, 8p
Availabilty: Published in Journal of Bacteriology v94 n1 p19-26 Jul 1967.

Descriptors: (*Peptide hydrolases, *Pasteurella), Plasmin, Mutations, Genetics, Chromosomes, Enzyme precursors.
Identifiers: Pesticins.

Mutational loss of pesticin I, a bacteriocin-like substance produced by Pasteurella pestis, is known to result in concomitant loss of a coagulase and fibrinolytic factor. No relationship was detected between pesticinogeny and other tested properties either associated with virulence or peculiar to P. pestis. Pesticin I was distinguished from the coagulase and fibrinolytic activities on the basis of anatomical distribution, behavior during gel filtration, and sensitivity to heat. Coagulase and the fibrinolytic factor were not differentiated by these criteria. Spontaneous suppressor mutations causing reversion to pesticinogeny were not detected, nor were such mutants obtained by treatment with ultraviolet light or 2-aminopurine. Attempts to demonstrate a common activator of pesticin I, coagulase, or the fibrinolytic factor in extracts of pesticinogenic cells were not successful. These results are in accord with the hypothesis that at least two structural genes for the three activities reside on a replicon distinct from the chromosome proper. Fibrinolytic activity was significantly reduced in the presence of 0.003 M epsilon-aminocaproic acid and was nonexistent on fibrin films freed from endogenous plasminogen by treatment with heat. Fibrinolytic activity on heated films could be restored by addition of plasma or serum from six mammalian species. Accordingly, the plague fibrinolytic factor, like staphylokinase or urokinase, promotes the conversion of plasminogen to plasmin. (Author)
AD-657 690 Not available from CFSTI.

AMINO ACID COMPOSITION OF CRYSTALLINE BOTULINUM TOXIN, TYPE A,
Fort Detrick Frederick Md
David Stefanye, Edward J. Schantz, and Leonard Spero. 24 Mar 67, 3p
Availability: Published in Journal of Bacteriology v94 n1 p277-8 Jul 1967.

Descriptors: (*Toxins + antitoxins, Amino acids), (*Clostridium botulinum, Toxins + antitoxins), Biological assay, Chemical analysis, Chromatographic analysis, Molecular properties.

The amino acid composition of the crystalline material was investigated using chromatographic techniques. The results of this analysis are presented, and some of the implications they have upon the subunit structure of the toxin are discussed.
AD-657 692 Not available from CFSTI.

CERTIFICATION OF PROBABILITY OF STERILIZATION OF LIQUID BY FILTRATION,
Fort Detrick Frederick Md
Dorothy M. Portner, Charles R. Phillips, and Robert K. Hoffman. 30 Jan 67, 9p
Availability: Published in Applied Microbiology v15 n4 p800-7 Jul 1967.

Descriptors: (*Sterilization, *Liquid filters), Spacecraft, Probability, Biological contamination, Membranes, Serratia marcescens, Microbiology.

Four types of hydrosol filters, two reusable (diatomaceous cylinder and fritted-glass funnel) and two disposable (asbestos pad and membrane filter) were challenged with a heavy bacterial suspension to assess their ability to produce sterile filtrates. Two of the four diatomaceous earth filters, the four fritted-glass funnels, and all of the asbestos pads tested generally gave sterile filtrates. However, only one type of filter, one of the membranes in its manufacturer's own holder, consistently gave sterile filtrates. The two other types of membranes usually gave sterile filtrates if tested in one manufacturer's holder, but all types invariably gave contaminated filtrates when tested in another manufacturer's holder. Contaminated filtrates were generally attributed to a poor reusable filter or to a faulty holder used with a disposable filter. If a high degree of certainty is required for sterile heat-labile filtrate, it is suggested that the liquid be passed through two or more filters in a previously tested and proven system. (Author)
AD-657 693 Not available from CFSTI.

AGAR-GEL PRECIPITIN-INHIBITION TECHNIQUE FOR HISTOPLASMOSIS ANTIBODY DETERMINATIONS,
Fort Detrick Frederick Md
John G. Ray, Jr. 30 Jan 67, 7p
Availability: Published in Applied Microbiology v15 n4 p794-9 Jul 1967.

Descriptors: (*Histoplasma, *Serodiagnosis), Antigens + antibodies, Sensitivity, Volumetric analysis.

The agar-gel precipitin-inhibition technique has been modified to detect antibodies of Histoplasma capsulatum in sera from human clinical cases and experimental animals infected with this organism. By use of this modified technique, the histoplasmosis can be detected more consistently and reliably than with the direct agar-gel diffusion test, and titers are comparable to those attained by the complement-fixation serological technique. (Author)
AD-657 694 Not available from CFSTI.

MICROBIOLOGICAL LABORATORY HAZARD OF BEARDED MEN,
Fort Detrick Frederick Md
For primary bibliographic entry see Field 6I.
AD-657 696 Not available from CFSTI.

THE EXOCELLULAR GLYCAN PRODUCED BY MYXOBACTERIUM 402.
National Research Council of Canada Ottawa (Ontario) Div of Biosciences
For primary bibliographic entry see Field 6A.
AD-657 701 Not available from CFSTI.

INDUCTION OF INTERFERON BY THE BOUR STRAIN OF TRACHOMA IN HELA 229 CELLS,
Washington Univ Seattle Dept of Preventive Medicine
H. M. Jenkin, and Y. K. Lu. 1967, 11p
NAMRU-2-TR-287
Grants Nonr (G)-00034-64, NIH-NB-03144
Presented in part at the Annual meeting of the American Society for Microbiology, May, 1966.
Availability: Published in American Journal of Ophthalmology v63 n5 pt2 p1110/84-9 May 1967.

Descriptors: (*Chlamydia trachomatis, Antimetabolites), Tissue culture, Tissue culture cells, Poliomyelitis virus, Infections.
Identifiers: Interferons, TRIC agents, Psittacosis-lymphogranuloma venereum-trachoma.

An inhibitor with many properties associated with interferon was induced in HeLa 229 cells by the Bour strain of trachoma, a member of the psittacosis-LGV-trachoma group of agents. Interferon induced by Bour was demonstrated by the inhibition of growth of poliovirus as well as the homologous trachoma strain. The yield of interferon was proportional to the inoculum dose. An inhibitor of growth of poliovirus was recovered from disrupted infected cells which has not been characterized and was not associated with the Bour agent. The significance of the inhibitor in relation to the problem of serial passage of trachoma agents in cell culture is discussed. (Author)
AD-657 709 Not available from CFSTI.

DIFFERENTIAL IDENTIFICATION OF MICROORGANISMS BY ANALYSIS OF PHOSPHORESCENT DECAY,
Naval Medical Research Inst Bethesda Md
S. L. Adelman, A. K. Brewer, K. C. Hoerman, and W. Sanborn. 18 Feb 67, 9p
Availability: Published in Nature v213 n5077 p718-20 Feb 18 1967.

Descriptors: (*Microorganisms, Phosphorescence), Identification, Morphology (Biology), Bacillus subtilis, Staphylococcus, Neisseria meningitidis.

Five bacterial strains were studied: Bacillus subtilis, Staphylococcus epidermidis, Neisseria meningitides Group A (strain 1027A), N. meningitides Group B (strain L-1), N. meningitides Group B (strain 2091B). Analysis of total emission phosphorescent spectra and light decay characteristics of the four micro-organisms and their substituents was highly reproducible from preparation to preparation in single organisms, and showed distinguishing marks of emitting domains from one organism to another. (Author)
AD-657 742 Not available from CFSTI.

SEROLOGICAL RESPONSE OF RHESUS MONKEYS TO HISTOPLASMA, BLASTOMYCES, AND COCCIDIOIDES ANTIGENS,
Walter Reed Army Inst of Research Washington D C
Robert L. Taylor. 13 Mar 67, 5p
Availability: Published in Journal of Bacteriology v94 n1 p1-5 Jul 1967.

Descriptors: (*Fungi, *Serodiagnosis), Histoplasma, Blastomyces, Coccidioides, Immune serums, Antigen-antibody reactions, Diseases, Monkeys.

Fifteen adult rhesus monkeys were inoculated with nonviable Histoplasma capculatum, Blastomyces dermatitidis, or Coccidioides immitis. Antibody assays were made periodically during a 2-year period by use of a complement-fixation (CF) test employing four antigens and a latex-agglutination test. Selected sera were also studied in an immunodiffusion test and a coccidioidin-precipitin test. The serological patterns obtained with the anti-Histoplasma, anti-Blastomyces, and anti-Coccidioides monkey sera were comparable to those of sera from patients with diseases caused by the respective organisms. Rhesus monkeys should provide a good laboratory model for additional studies, including the influence of multiple antigenic stimuli on serologic response and patterns. Monkeys could also be used for the production of antisera required for studies to improve the specificity of the currently available CF antigens. (Author)
AD-657 834 Not available from CFSTI.

DEVELOPMENT OF RAPID FIXATION METHODS FOR NEURAL TISSUE.
Final technical rept. 1 Apr 66-30 Apr 67,
IIT Research Inst Chicago Ill
William H. Blair. May 67, 62p Rept no. IITRI-L6034-3
Contract AF 41 (609)-3071

Descriptors: (*Brain, *Histological techniques), Central nervous system, Tissues (Biology), Preservation, Enzymes, Freezing, Morphology (Biology), Instrumentation.

The objective of this program was to develop methods for rapid fixation and preservation of central nervous system tissue. During the first phase of work a perfusion system was developed which would optimally preserve brain tissue with chemical fixatives. Various fixatives were tested and glutaldehyde was found to be the preservative of choice. It penetrated rapidly and maintained structural detail. In order to evaluate the efficiency of the fixative system, histochemical, white light microscopic and isoenzyme evaluations were done. Some reduction in histochemical activity was noted, while white light microscopy indicated good preservation of cellular detail. Isoenzyme evaluations indicated up to 90% loss of activity with chemical fixatives. A system was developed which would freeze brain tissue rapidly for biochemical analyses. Accordingly, a cryogenic probe was designed and constructed which will rapidly remove a plug of brain tissue and freeze it to liquid nitrogen temperature (-190C). This instrument can be operated remotely and will remove and freeze a piece of brain tissue in less than 5 sec. Histochemical and isoenzyme assay of frozen tissue plugs indicate optimal enzyme preservation. (Author)
AD-658 174 HC$3.00 MF$0.65

MICROBIOLOGICAL STUDIES OF AQUATIC HABITATS OF THE AREA OF INUVIK, NORTHWEST TERRITORIES.
Technical rept.,
Arctic Inst of North America Washington D C
William L. Boyd, and Josephine W. Boyd. 1967, 17p
Contract Nonr-3096 (01)
Prepared in cooperation with Colorado State Univ., Fort Collins.
Availability: Published in Arctic v20 p27-41 1967.

Descriptors: (*Microbiology, Arctic regions), Lakes, Rivers, Distribution, Microorganisms, Water supplies, Urban areas, Wastes (Sanitary engineering).

Chemical and microbiological studies were carried out on lakes, ponds, and the Mackenzie River in the vicinity of Inuvik. With a few exceptions the chemical composition of most of the bodies of water was uniform throughout the ice-free period. The number of psychrophilic and mesophilic bacteria increased in all cases but not necessarily at the same time; the counts of thermophilic bacteria and molds were low. Ancillary studies were also carried out on runoff water and the town's water distribution and sewage disposal systems. (Author)
AD-658 302 Not available from CFSTI.

ANTIBACTERIAL ACTION OF A BEE VENOM FRACTION (MELITTIN) AGAINST A PENICILLIN-RESISTANT STAPHYLOCOCCUS AND OTHER MICROORGANISMS,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6O.
AD-658 324 HC$3.00 MF$0.65

METABOLIC EFFECTS OF HYDROXYUREA ON BHK-21 CELLS TRANSFORMED WITH POLYOMA VIRUS.
Revised ed.,
Columbia Univ New York Dept of Microbiology
Richard D. Pollak, and Herbert S. Rosenkranz.
7 Mar 67, 12p
Contract Nonr-266 (89), Grant PHS-CA-08374
Revision of manuscript submitted 20 Oct 66.
Availability: Published in Cancer Research v27 p1214-24 Jul 1967.

Descriptors: (*Desoxyribonucleic acids, Biosynthesis), (*Tissue culture cells, Metabolism), Drugs, Ureides, Inhibition, Viruses, Ribonucleic acids, Proteins, Enzymes, Growth, Neoplasms, Antimetabolites.
Identifiers: Hydroxyurea.

Hydroxyurea interferes with the DNA metabolism of BHK-21 cells transformed by polyoma virus. The syntheses of RNA and proteins are not affected by concentrations of the drug which completely abolish DNA production. Evidence is presented which indicates that the metabolic block in DNA synthesis is not at the enzymic reduction of ribonucleotides to the corresponding deoxyribonucleotides. In BHK-21 cells, hydroxyurethan appears to have an effect similar to that of hydroxyurea. Hydroxylamine on the other hand was not found to be a specific inhibitor of DNA synthesis. (Author)
AD-658 408 Not available from CFSTI.

THE INFLUENCE OF IRRADIATION ON NEISSERIA MENINGITIDIS L-FORM INFECTION IN MICE.
Mary Imogene Bassett Hospital, Cooperstown, N. Y.
For primary bibliographic entry see Field 6R.
AD-806 604 HC$3.00 MF$0.65

BIOLOGICAL SIGNIFICANCE OF HIGH MOLECULAR WEIGHT POLYPEPTIDES FINAL REPORT, JUN. 1, 1963 - JUN. 30, 1966.
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Biophysics.
For primary bibliographic entry see Field 6A.
For abstract, see STAR 05 20.
N67-34016 HC$3.00 MF$0.65

A SEQUENTIAL DECISION MODEL OF PLANETARY QUARANTINE PRIMARY OBJECTIVES.
Sandia Corp., Albuquerque, N. Mex.
C. A. Trauth, Jr., Jun 67, 52p NASA-CR-87423, SC-RR-67-462
NASA ORDER R-09-019-040

Descriptors: *Decontamination, *Mathematical model, *Planetary exploration, *Sequential analysis, Analysis, Decision, Derivation, Exploration, Mathematics, Mission, Model, Planetary, Requirement, Sequence.

For abstract, see STAR 05 20.
N67-34044 HC$3.00 MF$0.65

AN IMPROVED SONICATION METHOD FOR REMOVAL OF MICROORGANISMS FROM SURFACES.

Sandia Corp., Albuquerque, N. Mex.
V. L. Dugan, C. M. Franklin, J. J. Mc Dade, and F. W. Oswalt. Jun 67, 26p NASA-CR-87429, SC-RR-67-492
NASA ORDER R-09-019-040

Descriptors: *Cavitation, *Microorganism, *Stainless steel, *Ultrasonic wave, Contamination, Factor, Stainless, Steel, Sterilization, Surface, Time, Ultrasonic, Wave.

For abstract, see STAR 05 20.
N67-34933 HC$3.00 MF$0.65

THE MICROBIAL PROFILE OF A VERTICAL LAMINAR AIRFLOW SURGICAL THEATER.
Sandia Corp., Albuquerque, N. Mex.
C. M. Franklin, J. J. Mc Dade, E. W. Rypka, J. G. Whitcomb, and W. J. Whitfield. Jun 67, 31p NASA-CR-87428, SC-RR-67-456
NASA ORDER R-09-019-040

Descriptors: *Laminar flow, *Microbiology, *Spacecraft contamination, *Surgery, Air, Airborne, Airflow, Contamination, Control, Environment, Flow, Laminar, Microorganism, Profile, Sample, Spacecraft, Survey, Vertical.

For abstract, see STAR 05 20.
N67-34949 HC$3.00 MF$0.65

6N. Personnel Selection and Maintenance (Medical)

RELATIONS BETWEEN VESTIBULAR NYSTAGMUS AND VISUAL PERFORMANCE.
Army-Navy Joint rept.,
Naval Aerospace Medical Inst Pensacola Fla
Fred E. Guedry, Jr. 24 May 67, 35p Rept no. NAMI-1008
USAARU-JR-67-3

Descriptors: (*Nystagmus, Visual acuity), Vestibular apparatus, Aviation personnel, Selection, Illumination, Vision, Aviation medicine.

Relationships between vestibular nystagmus and visual acuity were measured during application of different magnitude vestibular stimuli which interfered with voluntary efforts to see visual detail in controlled illumination. Significant relations were found among vestibular stimulus magnitude, nystagmus, and visual acuity. During illumination, nystagmus growth and decay curves depart markedly from curves found in darkness and from theoretical expectations. Steps in nystagmus slow phase velocity appear to be related to steplike shifts in visual acuity while steps in nystagmus amplitude seem to signify the point of surrender of voluntary efforts to maintain clear vision. Stepchanges in nystagmus may explain the 'physiological third stage of spin' reported in jet aircraft. Individual differences in Dynamic Visual Acuity-Vestibular are discussed in relation to Dynamic Visual Acuity and also in relation to flight safety. (Author)
AD-657 847 HC$3.00 MF$0.65

EXERTIONAL RHABDOMYOLYSIS IN NAVAL AVIATION OFFICER CANDIDATES.
Naval Aerospace Medical Inst Pensacola Fla
Raphael F. Smith. Aug 67, 31p Rept no. NAMI-1014

Descriptors: (*Aviation personnel, *Musculoskeletal diseases), Exercise, Stress (Physiology), Enzymes, Hemoglobin, Excretion, Physical fitness, Training, Medical examination, Muscles, Fatigue (Physiology).

In eight young men undergoing heavy repetitive exertion a syndrome of severe myalgia, myoglobinuria, elevated muscle-cell enzymes, and impaired muscle function persisting for weeks or months has been observed. Transient azotemia was present in six of the eight patients. There was a latent period of 30 to 40 hours after the extreme exercise task before myoglobinuria was noted, suggesting that exercise does not immediately cause maximal lysis of the skeletal muscle cell. The syndrome was not reproduced by stress testing after recovery. Thirty-eight aviation officer candidates were prospectively studied and the distribution of values of muscle-cell enzymes became negatively skewed after three days of intensive training. Four members of the prospective group had extreme enzyme values and two had myoglobinuria. The low incidence of overt rhabdomyolysis in a large, homogeneous population exposed to similar exercise stress conditions and the negatively skewed distribution of serum enzyme values in a sample of this population suggested that significant rhabdomyolysis occurs in certain predisposed individuals rather than in all poorly conditioned men assigned prolonged calisthenics. From these observations it is recommended that a graduated physical training program be adopted and single calisthenics carried to exhaustion be avoided. (Author)
AD-658 312 HC$3.00 MF$0.65

A SYSTEM FOR AUTOMATIC COLLECTION OF GEOMAGNETIC DATA IN DIGITAL FORM FINAL SCIENTIFIC REPORT.
Kiruna Geophysical Observatory (Sweden).
G. Gustafsson. 10 Feb 67, 24p AFCRL-67-0281, AD-653607
Contract AF 61/052/-237

Descriptors: *Automatic data processing system, *Data reduction, *Digital data, *Electronic equipment, *Geomagnetism, Analysis, Automatic, Computer, Data, Development, Digital, Electronic, Engineering, Equipment, Geomagnetic, Magnetism, Magnetovariograph, Mathematics, Numerical, Performance, Prediction, Processing, Recording, Reduction, Sampling, Sensitivity, Spectrum, Statistical, Storm, System, Terrestrial.

For abstract, see STAR 05 20.
N67-34064 HC$3.00 MF$0.65

6O. Pharmacology

THE EVALUATION OF VASOACTIVE AGENTS IN SHOCK WITH AND IN THE ABSENCE OF INTRAVENOUS FLUID THERAPY.
Pennsylvania Univ Philadelphia Harrison Dept of Surgical Research
For primary bibliographic entry see Field 6E.
AD-657 673 HC$3.00 MF$0.65

SYNTHESIS OF ATROPINE LABELED WITH C14 IN THE TROPINE RING AND EFFECT OF COLD ACCLIMATION ON ATROPINE METABOLISM.
Final rept.,
Pittsburgh Univ Pa School of Medicine
G. C. Schmidt, and T. E. Eling. Jul 67, 9p
AFOSR-67-2030
Grant AF-AFOSR-87-66

Descriptors: (*Atropine, Synthesis (Chemistry)), (*Alkaloids, Metabolism), (*Metabolism, Atropine), (*Acclimatization, Atropine), Succinic acids, Ketones, Labeled substances, Mice, Tracer studies, Lethal dosage, Exposure.

An investigation was directed to scaling down from 5 gm. to 300-400 mg level the synthesis of tropinone from succinic acid. Detailed studies for the formation of tropinone from precursor, conversion of tropinone to tropine and formation of atropine via the esterification of tropine with tropic acid was conducted. Work was also undertaken on the labeling of atropine. After several abortive attempts, a small yield of N-Me14 tropine was obtained. A batch of N-Me14-atropine has been prepared from the N-Me14-tropine; this material was used for some metabolic studies in mice. Two attempts at making ring-labeled atropine are in progress. The 3-C14, and the 2,3,4-C14-atropine were prepared, but the yields and specific activities were lower than anticipated.
AD-657 787 HC$3.00 MF$0.65

PRIMAQUINE SENSITIVITY IN CAUCASIANS: HEMOLYTIC REACTIONS INDUCED BY PRIMAQUINE IN G-6-PD DEFICIENT SUBJECTS.
Georgetown Univ Washington D C School of Medicine
For primary bibliographic entry see Field 6E.
AD-657 836 Not available from CFSTI.

SECONDARY EVALUATION OF POTENTIAL ANTIMALARIAL AGENTS.
Annual progress rept. 1 Aug 66-31 Jul 67,
IIT Research Inst Chicago Ill Technology Center
Maurice E. King, and Morris D. Schneider. Jul 67, 55p Rept no. IITRI-L6030-8
Contract DA-49-193-MD-2760

Descriptors: (*Antimalarials, Effectiveness), (*Plasmodium, Preservation), Storage, Diseases, Chemotherapy, Resistance (Biological), Pathology, Triazines, Cinchona alkaloids, Viability, Low-temperature research.

The objectives of this program are to screen compounds against normal and drug-resistant strains of malaria and to develop procedures for use in low-temperature storage of plasmodia. Secondary screening of chemicals against normal P. berghei was continued. Test procedures were developed and utilized for screening against chloroquine-, triazine-, and DDS-resistant P. berghei in mice. A serum-free preservative was developed that maintained the viability and virulence of sensitive and drug-resistant malaria after storage at -196C for up to 225 days. This solution was also used to determine whether a splenic bank could be used as an alternative to an erythrocytic bank for the low-temperature storage of plasmodia. (Author)
AD-658 234 HC$3.00 MF$0.65

EFFECT OF INNOVAN ON SUBCORTICAL STRUCTURES IN MONKEYS.
Preliminary rept.,
California Univ Los Angeles School of Medicine
Eva M. Kavan, M. L. Reite, J. M. Rhodes, and W. R. Adey. 2 Jan 67, 7p
AFOSR-67-2107
Contract AF 49 (638)-1387, Grant NsG-502
Availability: Published in Acta Anaesth Scandinav v11 p109-13 1967.

Descriptors: (*Anesthetics, Electroencephalography), Brain, Drugs, Dosage, Responses, Monkeys, Surgery.
Identifiers: Innovan.

The effect of Innovan on cortical and certain subcortical structures was observed in three Macaque monkeys. The drug was administered in two different doses. In the first experiments, the dose was calculated from the recommended dosage for humans. In the second experiments, the dose was five times larger. Short runs of high-voltage activity occurred in all animals at irregular intervals. They appeared only when the larger dose was administered and were not accompanied by any clinical or behavioral manifestations. (Author)
AD-658 262 Not available from CFSTI.

SYNTHESIS OF TROPINE-LABELED ATROPINE I. MICRO METHODS FOR THE SYNTHESIS OF TROPINE AND FOR ITS ESTERIFICATION WITH TROPIC ACID.

Revised ed.,
Pittsburgh Univ Pa School of Medicine
Gilbert C. Schmidt, Thomas E. Eling, and John C. Drach. 19 Oct 66, 9p
AFOSR-67-2104
Grants AF-AFOSR-87-66, PHS-GM-13844
Revision of manuscript submitted 16 Sep 66. Prepared in cooperation with Alabama Univ., Birmingham.
Availability: Published in Journal of Pharmaceutical Sciences v56 n2 p215-9 Feb 1967.

Descriptors: (*Atropine, Synthesis (Chemistry)), N-heterocyclic compounds, Alcohols, Carboxylic acids, Esters, Condensation reactions, Labeled substances, Aromatic compounds.
Identifiers: Esterification, Tropic acids, Tropines.

Yields for each step in the esterification of tropine and tropic acid were determined with micro and semimicro quantities of reactants. In a similar way, the Robinson condensation was studied. Data are compared with the findings of other investigators. In the esterification of micro quantities of tropine and tropic acid, 70-75 per cent of theoretical atropine yields are obtained routinely. Based on any intermediate in the Robinson condensation, micro quantities of reactants routinely produce 67-72 per cent of theoretical tropine yields. Predicted yields of 47-54 per cent atropine from Robinson intermediates were confirmed by synthesis of atropine from each of the Robinson reactants. The procedures are designed for the synthesis of labeled tropine and tropine-labeled atropine from labeled arabinose. (Author)
AD-658 270 Not available from CFSTI.

ULTRASTRUCTURAL ASPECTS OF THE INHIBITION OF NEUROSECRETION BY PUROMYCIN,
Consejo Nacional de Investigaciones Cientificas Y Tecnicas Buenos Aires (Argentina)
For primary bibliographic entry see Field 6P.
AD-658 275 Not available from CFSTI.

ANTIBACTERIAL ACTION OF A BEE VENOM FRACTION (MELITTIN) AGAINST A PENICILLIN-RESISTANT STAPHYLOCOCCUS AND OTHER MICROORGANISMS,
Naval Radiological Defense Lab San Francisco Calif
Jean F. Fennell, William H. Shipman, and Leonard J. Cole. 14 Aug 67, 23p Rept no. USNRDL-TR-67-101

Descriptors: (*Venoms, *Antibiotics), (*Hymenoptera, Venoms), Penicillins, Resistance (Biological), Staphylococcus aureus, Antimetabolites, Microorganisms, Germicides.

Bee venom and its melittin fraction were shown to have antibacterial activity against a penicillin-resistant strain of Staph aureus (strain 80). This activity of bee venom and melittin was demonstrated by a method similar to that used for plate sensitivity tests. Both whole bee venom and its melittin fraction were also able to inhibit the growth of 20 of the 30 different bacterial organisms tested. More Gram positive organisms (86%) were sensitive to bee venom and to melittin than Gram negatives (46%). The antibacterial activity of bee venom and melittin were of the same magnitude. The zones of inhibition created by bee venom and melittin were compared with those caused by penicillin, and the equivalent units of penicillin were computed. The antibiotic potency of a single bee sting was also determined. Among the Gram positives, the antibacterial effect of a 1:10 dilution of whole liquid bee venom was equal to that of penicillin at a concentration of 0.093 to 17.0 units/ml. The same dilution of bee venom when tested against Gram negative organisms compared to a higher range of penicillin values-93 to 1,700 units/ml. (Author)
AD-658 324 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF ISOQUINALDEHYDE THIOSEMICARBAZONE (NSC-92188).
Supplementary rept.,
Mason Research Inst., Worcester, Mass.
Ulrich Schaeppi. 9 Jun 67, 31p
Contract PH-43-64-51

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Dogs, Monkeys, Dosage, Hematology, Blood chemistry, Histology, Pathology, Liver, Leukocytes, Kidneys, Pharmacology, Toxic tolerances.
Identifiers: Isoquinalaldehyde thiosemicarbazone.

Isoquinalaldehyde thiosemicarbazone (NSC-92188) 18.75 mg/kg administered orally for 14 days to 4 dogs and 2 monkeys produced slight toxic effects as: temporary decrease in leukocytes and temporary hepatotoxicity. The observations that hepatotoxicity failed to occur in monkeys, agrees with earlier findings that hepatotoxicity of this compound consistently was less pronounced in monkeys than compared with the one in dogs (toxicologic evaluation of Isoquinalaldehyde thiosemicarbazone, report from January 3, 1967). One of the 2 monkeys reacted with interstitial nephritis, the other one showed a temporary decrease in white blood cells. (Author)
PB-175 692 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF NOGALAMYCIN (NSC-70845).
Final rept.,
Mason Research Inst., Worcester, Mass.
Ulrich Schaeppi. 23 Jun 67, 15p
Contract PH-43-65-51

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Dosage, Lungs, Blood vessels, Dogs, Hematology, Blood chemistry, Urine, Histology, Pathology, Pharmacology, Toxic tolerances, Cannulation, Implants, Leukocytes, Parenteral infusions.
Identifiers: Nogalamycins.

The repeated dose toxicity of Nogalamycin (NSC-70845) was determined in 2 beagles. The animals had cannulas chronically implanted in their jugular vein. Nogalamycin was administered for a period of 12 hours on 5 subsequent days. Both animals were in good condition throughout treatment and subsequent post-treatment observation period and with exception of an increase in white blood cells there were no changes in hematology or in blood chemistry. The autopsy of the one dog which was sacrificed 3 days after termination of treatment showed inflammation and thrombus formation in the arterioles of the lung and inflammation of the surrounding lung tissue. No pathological changes were observed in the other dog which was sacrificed after a 27 day post-treatment observation period. The occurrence of toxic vascular changes in the lungs which was observed in one of the dogs confirm earlier observations in beagles which had been treated with intravenous injections or with 1 hour infusions of Nogalamycin. The present observations together with earlier observations raise the question whether this compound should be used for administration in humans. (Author)
PB-175 693 HC$3.00 MF$0.65

REPEATED INTRAVENOUS ADMINISTRATION - WEANLING PIGS,
Hazleton Labs., Inc., Falls Church, Va.
Howard Feinman, and T. W. Tusing. 10 Aug 67, 53p Rept. no. 219
Contract PH-43-63-1168

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Swine, Behavior, Appetite, Body weight, Hematology, Blood chemistry, Histology, Pathology, Pharmacology, Toxic tolerances, Dosage, Liver function tests, Kidney function tests, Hemopoietic system, Gastrointestinal system, Parenteral infusions.
Identifiers: Cytosine arabinosides.

Fourteen weanling pigs received up to 15 consecutive daily intravenous doses of cytosine arabinoside hydrochloride. The criteria of effect evaluated were appearance and behavior, appetite, body weight, hematologic and biochemical studies, and gross and microscopic pathology. Pigs which received 2 mg/kg/day maintained normal appearance and behavior throughout the period of study. Dosage levels of 4, 8, 15, and 16 mg/kg/day produced an effect among the animals, as evidenced by decreased activity, depression, decreased appetite and weight loss and, among some animals, vomiting, diarrhea, and blood tinged stools. Death or morbidity, necessitating sacrifice, occurred at the levels ranging from 4 to 15 mg/kg/day, given over a 10 to 15-day period. The results of clinical laboratory studies revealed alterations in the hemograms of the animals receiving dose levels ranging from 4 to 16 mg/kg/day. Platelet counts, white blood cell counts, and hematocrit and hemoglobin determinations were reduced. Biochemical studies revealed no dose related changes in the liver and kidney function tests. Pathologic examination of tissues from each of the pigs revealed compound related changes were produced in the animals that received the higher dose levels of 4 to 15 mg/kg/day. There were no compound induced changes in the lower level animals that received 2 mg/kg/day, or in the one animal that received 16 mg/kg/day for only five days and was held for a 31-day observation period. Compound induced changes involved the hematopoietic tissue and the gastrointestinal tract mucosa. (Author)
PB-175 794 HC$3.00 MF$0.65

SINGLE-DOSE TOXICITY IN MICE OF MICROIZED AND NON-MICRONIZED SAMPLES OF ISOQUINALALDEHYDE THIOSEMICARBAZONE (NSC-92199) AND ATTEMPTS TO DEVELOP AN INTRAVENOUS DOSAGE FORM.
Research rept.,
Mason Research Inst., Worcester, Mass.
Emil Smith. 20 Jan 67, 17p
Contract PH-43-65-51

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Dosage, Mice, Parenteral infusions, Lactic acid, Blood chemistry, Urine, Pharmacology, Toxic tolerances.
Identifiers: Isoquinalaldehyde thiosemicarbazone.

A comparison was made of the single-dose oral toxicity of micronized and non-micronized isoquinalaldehyde thiosemicarbazone (NSC-92188). There were no obvious differences between the responses to the two preparations. Attempts to develop a suitable intravenous dosage form were not successful. High concentrations of lactic acid, in which the drug is relatively soluble, were found to interfere with its determination in whole blood, although the compound could be determined at low concentrations in whole blood, plasma and urine in the presence of low concentrations of some solvents. (Author)
PB-175 795 HC$3.00 MF$0.65

STUDIES ON THE TOXICITY OF NICOTINAMIDE FOLLOWING DAILY ORAL ADMINISTRATION TO BEAGLE DOGS.
Research rept.,
South Shore Analytical and Research Lab., Inc., Islip, N. Y.
Nathan Rakieten. 29 Jun 67, 28p
Contract PH-43-64-932

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Dogs, Dosage, Pathology, Toxic tolerances, Blood chemistry, Hematology, Histology, Liver, Pharmacology.
Identifiers: Nicotinamides.

Nicotinamide when administered orally to beagle dogs was toxic at dose levels of 1,000 mg/kg/day

x 3 and 6, and 500 mg/kg/day x 6 and 8. The tolerable dose was 100 mg/kg/day x 14. Overt toxic symptoms noted at 1,000 and 500 mg/kg/day consisted of emesis, diarrhea, anorexia, weight loss, sedation, hypothermia, but the eyes of the animals were effected to the greatest extent. The changes noted in the eyes consisted of conjunctivitis, chemosis, bluish gray discoloration and in some of the animals, blindness. At these dose levels the drug produced a leukocytosis, hyperglycemia, BSP retention and increase in alkaline phosphatase (1/2 animals on 500 mg/kg/day), and increases in SGOT and SGPT (1/2 animals on 500 mg/kg/day). At the dose level of 100 mg/kg/day the animals remained in good condition except for a mild injection of the sclera in one of the two animals. At this dose level the animals also showed increases in WBC and alterations in SGOT and SGPT. These changes in blood chemistry and hematology were reversible in the one animal studied during an observation period. Histopathology: Liver pathology was noted consisting of a mild reactive hepatitis at all dose levels, but apparently was reversible at the 100 mg/kg/day dose level since the one animal which was allowed to recover from the effects of the drug showed a normal liver. (Author)
PB-175 796 HC$3.00 MF$0.65

EFFECTS UPON CHOLERESIS IN BEAGLES: DECREASE INDUCED WITH SARAMYCETIN (NSC-100844) AND INCREASE INDUCED WITH TAUROCHOLIC ACID Na.
Research rept.,
Mason Research Inst., Worcester, Mass.
U. Schaeppi. 21 Jul 67, 8p
Contract PH-43-65-51

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Dogs, Parenteral infusions, Hematology, Blood chemistry, Biliary system, Bile, Toxic tolerances, Pharmacology, Dosage.
Identifiers: Saramycetin.

The rate of bile production was studied in 2 dogs which had been immobilized by transection of the midbrain. Saramycetin, 64 mg/kg and 128 mg/kg given intravenously produced a protracted decrease in bile flow (observations in one beagle) whereas Taurocholic acid Na 82.5 mg/kg and 261.5 mg/kg led to a marked increase in the rate of the production of bile (observation in 2 beagles). (Author)
PB-175 797 HC$3.00 MF$0.65

A COMPUTER ORIENTED SCHEME FOR CODING CHEMICALS IN THE FIELD OF BIOMEDICINE.
Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
For primary bibliographic entry see Field 5B.
PB-175 808 HC$3.00 MF$0.65

EFFECTS OF 5-FLUOROURACIL ON NORMAL SHEEP,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
UCRL-50242 HC$3.00 MF$0.65

6P. Physiology

A MATHEMATICAL MODEL OF THE HUMAN EXTERNAL RESPIRATORY SYSTEM,
RAND Corp., Santa Monica, Calif.
George B. Dentzig, Irwin Cooper, Edward C. DeLand, Selmer M. Johnson, and James C. DeHaven. 28 Sep 59, 109p RM-2519
Contract AF 49 (638)-700

Descriptors: (*Respiratory system, Mathematical models), Biochemistry, Respiration, Models (Simulations), Thermodynamics, Digital computers, Analog computers, Optimization, Mathematical programming, Oxidation-reduction reactions.

The study examines the thesis that a part of the human physiological system can be simulated by a suitably constructed mathematical model. This paper presents the results of a simulation of the external respiratory function. Respiration, and the consequent gas exchanges at the lung surfaces, involves many chemical reactions and a transformation of venous blood into arterial blood. This activity was chosen as a test case to explore the feasibility of constructing a mathematical model of a human subsystem. Basing their work on the known physiological and chemical aspects of this subsystem, the authors have constructed a mathematical model that, when solved, yields values describing the major phenomena of the subsystem. The values of some thirty different molecular species as determined by the model are in excellent agreement with observed values. In the present form of the model, emphasis was placed on the chemistry and thermodynamics of the subsystem rather than on the physical dynamics, such as flow and mixing. These time-phased phenomena are expressed only implicitly at this stage. In spite of these and other approximations, this exercise appears to demonstrate that the mathematical art is now capable of representing such systems having large and complex sets of functionally interrelated variables, and that there is reason to be optimistic about the possibilities of representing other more complicated human subsystems and interconnecting them. (Author)
AD-246 199 HC$3.00

BODY COMPOSITION OF A MILITARY POPULATION, FORT CARSON, 1963. I. BODY DENSITY, FAT, AND POTASSIUM 40,
Army Medical Research and Nutrition Lab Denver Colo
H. J. Krzywicki, and K. S. K. Chinn. 1967, 8p
Availability: Published in American Journal of Clinical Nutrition v20 n7 p708-15 Jul 1967.

Descriptors: (*Body, Volume), Military personnel, Lipids, Potassium, Density, Aging (Physiology), Body weight, Correlation techniques.

Body volumes were measured on 97 soldiers between the ages of 17 and 52 years by water displacement volumetry and corrected for respiratory gas by a nitrogen-washout technique. Total body potassium 40 was measured by a NaI crystal low level gamma radiation counter. The subjects were grouped into 5-year age increments and compositional changes were noted to occur in percent body fat and quantity of body potassium present. Body density decreased with age reflecting an increase in body fat. Total body potassium decreased with age. Both parameters varied independently of body weight and appear to be age dependent. Eight additional obese subjects were found to have the lowest body density and total body potassium values (grams of potassium per kilogram body weight). Effective ranking of body fat burdens of populations was demonstrated by body volumetry and age differences were noted from potassium-40 counting. A correlation coefficient of $r = 0.731$ was demonstrated between body density and body potassium (grams of potassium per kilogram body weight). (Author)
AD-657 822 Not available from CFSTI.

CARDIOPULMONARY RESPONSES OF RESTING MAN DURING EARLY EXPOSURE TO HIGH ALTITUDE,
Army Medical Research and Nutrition Lab Denver Colo Physiology Div
For primary bibliographic entry see Field 6S.
AD-657 823 Not available from CFSTI.

BRAIN STEM SYSTEMS AND BEHAVIOR.
Final scientific rept. 1 Jun 66-31 May 67,
Milan Univ (Italy) Istituto Di Patologia Medica Cesare Bartorelli, and Alberto Zanchetti. Jul 67, 43p
AFOSR-67-2012
Grant AF-EOAR-47-66

Descriptors: (*Sleep, *Blood circulation), (*Electrophysiology, *Cardiovascular system), Blood pressure, Arteries, Hypotension, Chemoreceptors, Brain, Inhibition, Autonomic nervous system, Nerve cells, Electroencephalography, Italy.

Experiments were devised with the aim of further clarifying the hemodynamics of deep desynchronized sleep. Information was sought along two different approaches. (1) Comparison of arterial pressure changes in desynchronized sleep before and after various kinds of heart denervation showed that the neural control of the heart is not basically involved in the blood pressure fall occurring in sleep. (2) Experiments in which, besides arterial pressure, cardiac output was continuously measured by means of electromagnetic flowmeters, showed that hypotension during desynchronized sleep usually results from a decreased peripheral resistance with only a slight decrease in cardiac output. This suggests vasodilatation brought about by decreased sympathetic activity. A different hemodynamic pattern (cardiac output dramatically decreased, proportionally more than arterial pressure) was observed only in a few episodes of desynchronized sleep in sino-aortic deafferented cats, whenever signs of cerebral ischemia occur. An experimental program was started to study the influence of inhibitory and excitatory visceral afferents from the vagi and/or aortic nerves upon hippocampal pyramidal neurons, recorded intracellularly. (Author)
AD-657 824 HC$3.00 MF$0.65

CHANGES IN PLASMA THYROXINE CONCENTRATION AND METABOLISM, CATECHOLAMINE EXCRETION AND BASAL OXYGEN CONSUMPTION IN MAN DURING ACUTE EXPOSURE TO HIGH ALTITUDE.
Colorado Univ Denver Dept of Medicine
For primary bibliographic entry see Field 6S.
AD-657 825 Not available from CFSTI.

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS: PERFORMANCE AND CARDIOVASCULAR EVALUATION,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6S.
AD-657 827 Not available from CFSTI.

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS (10 DAYS),
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6S.
AD-657 828 Not available from CFSTI.

FEDERATION OF MALAYA, NUTRITION SURVEY SEPTEMBER-OCTOBER 1962.
Interdepartmental Committee on Nutrition for National Defense Washington D C
Sep 64, 371p
Prepared in cooperation with Agency for International Development, rept. no. 4/10/02880.

Descriptors: (*Nutrition, Malaya), (*Food, *Agriculture), (*National defense, *Medical research), Armed forces (Foreign), Economics, Biochemistry, Population, Southeast Asia, Diseases, Dentistry.

The report gives a factual evaluation of the growth and development of children, the state of physical health of adults including the occurrence of hypertensive vascular disease, obesity and diabetes, and it also delineates the adequacy or inadequacy of

nutrition in terms of specific chemical components and vitamins and minerals. This information when coupled with the knowledge of available food supplies and customary food habits should enable the Malaysian government to correct any deficiencies which do exist. This report should be instrumental in aiding the Ministry of Health as well as the Ministry of Agriculture and other governmental agencies in future planning for the welfare of this progressive country.
AD-657 980 HC$3.00 MF$0.65

EFFECTS OF DIET AND ALTITUDE ON GROWTH AND FOOD INTAKE OF RATS,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6S.
AD-658 070 HC$3.00 MF$0.65

CONTENT AND DISTRIBUTION OF POTASSIUM AND CREATINE IN RATS,
Army Medical Research and Nutrition Lab Denver Colo
Kenneth S. K. Chinn. Jul 67, 23p Rept no. US-AMRNL-310

Descriptors: (*Potassium, Muscles), (*Amino acids, Muscles), Tissues (Biology), Musculoskeletal system, Proteins, Aging (Physiology), Sex, Rats, Excretion.

Concentration and distribution of potassium and creatine in muscle and nonmuscle tissues were studied in 52 albino rats (40 males and 12 females). The potassium to protein ratio of the entire skeletal muscle system was found to be remarkably constant, regardless of age or sex differences. The potassium to protein ratio of the nonmuscle tissues, on the other hand, was highly age dependent. Accordingly, there was a rapid increase, from age 39 to 70 days, in the percentage of total body potassium found in muscle; however, from age 71 days and beyond, 55.58 plus or minus 2.32% of total body potassium was found in muscle. There was a significant difference ($P<0.01$) in the concentration of creatine in muscle protein between young (39 to 70 days old) and adult (71 days and beyond) rats. Such age differences were not observed in creatine concentration of nonmuscle protein. Of total body creatine, only 78.81 plus or minus 3.64% was found in skeletal muscle of adult rats. (Author)
AD-658 071 HC$3.00 MF$0.65

THE VAGAL INHIBITORY RESPONSES OF THE STOMACH TO STIMULATION OF THE DOG'S HIGHER BRAIN STEM.
Final rept. no. 2, 23 Jul 66-22 Jul 67,
Hiroshima Univ (Japan) School of Medicine
Takehiko Semba. Jul 67, 29p
ARDG (FE)-J-247-4-F
Contract DA-92-557-FEC-38416

Descriptors: (*Stomach, Electrophysiology), Autonomic nervous system, Responses, Nervous system, Physiology, Brain, Motor reactions, Inhibition, Stimulation, Nerves, Histology, Japan.

The inhibitory response of the stomach movement through the vagus nerve and the motor response of the stomach through the splanchnic nerve were investigated in the dog's midbrain. The dog was previously transected the spinal cord in the experiment of the vagal inhibitory response, and in the experiment of the splanchnic motor response, the animal was previously transected the bilateral vagus nerves. The stimulated areas were examined histologically. The inhibitory response of the stomach movement was obtained through the vagus nerves. This was abolished after the application of the hexamethonium bromide. A large number of the stimulated areas was located in the formatio reticularis, nn. colliculi inf., lemniscus medialis, tr. sp.-m-thalamicus, substantia grisea cent., substantia nigra, tr. rubrospinalis and so on. The connection between the vagal inhibitory areas in the midbrain and pons and the inhibitory center in the medulla oblongata is discussed. The splanchnic motor response of the stomach movement was induced through the splanchnic nerves, as well as the inhibitory response of the stomach movement. A large number of the stimulated areas was located in the formatio reticularis, nn. cuneiformis, substantia grisea cent., nn. ruber, tr. sp.-m-thalamicus, substantia nigra and so on. The connection between the splanchnic motor areas in the midbrain and pons and the motor center in the medulla oblongata is discussed. (Author)
AD-658 085 HC$3.00 MF$0.65

PHYSICAL FITNESS AND HUMAN TOLERANCE TO ACUTE EXPOSURE TO LIFE AT HIGH ALTITUDE. EFFECT ON HEMATOCRIT AND HEMOGLOBIN VALUES OF VARIATIONS IN THE STATE OF PHYSICAL ACTIVITY, PHYSICAL CONDITION AND ALTITUDE.
Progress rept. 1967-4,
Saint Mary'S Hospital San Francisco Calif Dept of Medical Education
Cutting B. Favour, John A. Faulkner, and James Kolias. Mar 67, 20p
Contract DA-49-193-MD-3059
Rept. on Acceleration of Acclimatization to High Altitude Studies Carried Out at Sea Level, Intermediate, and High Altitudes. Prepared in cooperation with Michigan Univ., Ann Arbor. Dept. of Physical Education, and Pennsylvania State Univ., University Park. Lab. for Human Performance.

Descriptors: (*Acclimatization, *Physical fitness), High altitude, Exercise, Hematocrit, Hemoglobin, Blood volume, Oxygen consumption, Adaptation (Physiology), Hematology.

Attention was focused on three variables: (1) The role of exercise in raising the hematocrit; (2) the role of physical fitness in preserving a degree of homeostasis close to an hematocrit level of 40 which is the viscosity and cell concentration for optimal 'oxygen flow' to the tissue; and (3) the role of changing altitudes as an independent variable which change is associated with a rise in hematocrit and hemoglobin both at rest and during exercise and more so in the sedentary than in the fit subject. The data suggest that the peripheral venous blood hematocrit and hemoglobin levels are lower in athletes than they are in sedentary or fit subjects. Exposing athletes to high altitude apparently does not raise these lower hematocrit and hemoglobin levels as much as this exposure does in healthy normal subjects. This phenomenon can be interpreted to be evidence for a physiological cross-adaptation between high degrees of physical fitness and speed of acclimatization to high altitude. (Author)
AD-658 169 HC$3.00 MF$0.65

BIO-INFORMATION PROCESSINGS OF THE ELECTROENCEPHALOGRAPHIC MASSPOTENTIALS IN ANIMAL AND MAN.
Final rept. 5 May 66-4 May 67,
Nagasaki Univ (Japan) Dept of Physiology
Kensuke Sato. Jul 67, 89p
ARDG (FE)-J-267-2
Contract DA-92-557-FEC-39566

Descriptors: (*Electroencephalography, Statistical processes), Information theory, Stochastic processes, Brain, Cerebral cortex, Statistical analysis, Electrophysiology, Nerve cells, Nerve impulses, Responses, Humans, Animals, Data processing systems, Digital computers, Japan.

Bio-information processings of the brain masspotentials of man, monkey, cat and rabbit, which were recorded on magnetic tapes, were carried out through General Purpose Digital Computers. Evidences were found to suggest that man and animal brains operate their bio-information processing through normal Gaussian stochastic processes, at least for the first approximation. Late responses in the visual evoked potential of cerebral cortex of man, monkey, cat and rabbit were also manifested as related to stages of background EEG activities shown in their autocorrelograms. It was found that peak latencies of later responses of cerebral palsy children were reduced compared with those of normal children, and those of later oscillatory potentials of rabbit also abbreviated progressively with lowering background EEG activities, though those of initial oscillatory potentials were elongated more and more. The former evidences may suggest impaired negative feed back action, such as recurrent inhibition. Alpha, beta, theta and delta waves in EEG were simulated by repetitive summation of an evoked potential elicited by a single flash stimulus with the same repetitive frequencies as each of the above EEG waves. This finding suggests that the EEG generating mechanism would be a masspotential due to changes in membrane potentials of cerebral neurone aggregates elicited by enumerable afferent trains of impulses. (Author)
AD-658 170 HC$3.00 MF$0.65

PHYSICAL FITNESS AND HUMAN TOLERANCE TO ACUTE EXPOSURE TO LIFE AT HIGH ALTITUDE. EXPERIMENTAL DESIGN AND DATA PROCESSING METHODOLOGY FOR CLINICAL PHYSIOLOGICAL OBSERVATIONS.
Progress rept. 1967-1,
Saint Mary'S Hospital San Francisco Calif Dept of Medical Education
Cutting B. Favour. Jan 67, 35p
Contract DA-49-193-MD-3059
Rept. on Acceleration of Acclimatization to High Altitude Studies Carried out at Sea Level, Intermediate and High Altitudes.

Descriptors: (*Acclimatization, Experimental design), High altitude, Medical laboratories, Data processing systems, Collecting methods, Experimental data, Computers, Medical research, Documentation.

A description is given of the methods by which measurements of various physiologic changes during exposure to altitude were collected. The type of log books which were kept are described in detail. The data processing system had five stages: (1) Chronological logging of raw data in separate log books; (2) preparation of edited input data sheets and data cards; (3) Computer output and human editing of data output cards; (4) Computer output and human editing of summary output cards; (5) computer output and final human interpretation of P and F values for significance of the results obtained.
AD-658 185 HC$3.00 MF$0.65

PHYSIOLOGICAL ACTIVITY OF THE BROWN ADIPOSE TISSUE.
Final rept. 15 Jul 66-14 Jul 67,
Hokkaido Univ Sapporo (Japan) School of Medicine
Shinji Itoh. Jul 67, 36p
ARDG (FE)-J-283-2
Grant DA-CRD-AG-S92-544-66-G51

Descriptors: (*Adipose tissue, Oxygen consumption), Metabolism, Heat production (Biology), Thyroid hormones, Thyroxine, Exposure, Levarterenol, Cold weather tests, Acclimatization, Blood circulation, Thyroid gland, Diseases, Mice, Rats, Japan.

Brown adipose tissue was recently found to be a major site of heat production in cold-adapted animals. It is also known that the increased secretion of thyroid hormone is responsible for the thermogenesis during cold exposure. Accordingly, the thyroid hormone is possibly presumed to stimulate the metabolic activity of brown adipose tissue. The present study was mostly attempted to know the

functional relationship between thyroid hormone and brown adipose tissue with respect to cold exposure. In the first series of experiments oxygen consumption of interscapular brown adipose tissue of the mouse was determined. Cold exposure for 5 days produced a significant increase in fat-free dry matter of brown adipose tissue. Concurrent rise in oxygen consumption of this tissue was found. In the next series of experiments, blood flow through interscapular brown adipose tissue was estimated by radioactive indicator method under various experimental conditions in the rat. Chronic cold exposure at 4-5C for 2 weeks as well as acute exposure at 3C for 30 min resulted in a marked increase in the blood flow, 14.7-fold and 2.5-fold respectively. Intravenous infusion of norepinephrine into normal rats produced 6.4-fold increase in the blood flow through brown adipose tissue. Thyroidectomized and methylthiouracil-treated rats failed to respond to chronic cold exposure in increasing the blood flow through brown adipose tissue. (Author)
AD-658 207 HC$3.00 MF$0.65

THE RELATION BETWEEN AMINO ACID AND GLUCOSE METABOLISM IN DEVELOPING BRAIN.
Final rept. 17 May 66-16 May 67,
Keio Univ Tokyo (Japan) Dept of Physiology
Genkichiro Takagaki. Aug 67, 22p
ARDG (FE)-J-229-4
Contract DA-92-557-FEC-38116

Descriptors: (*Glycolysis, Brain), (*Brain, Metabolism), Amino acids, Glucose, Carbohydrates, Saccharide phosphates, Phosphorus transferases, Potassium, Pyruvic acid, Japan.

The metabolism of the brain is characterized by emphasis on carbohydrate as the energy source and the rate of the energy metabolism increases during the neural excitation. It is generally believed that the control steps in glycolytic pathway are those concerned with phosphorylation of glucose (hexokinase) and fructose-6-phosphate (phosphofructokinase). Although the data presented in this report are consistent with this consideration, they clearly indicate that, in addition to the above two, the step catalyzed by pyruvate kinase is rate-limiting and controlling for glycolysis in brain cortex slices. Pyruvate kinase in brain tissue seems to be strongly inhibited in some way which is related to the cellular structures and this inhibited activity is regulated by the ionic milieu. The changes in the intermediate levels of the glycolytic pathway in the brain cortex slices by the addition of high potassium in the incubation medium were characterized by decreases in glucose-6-phosphate and fructose-6-phosphate, and by increases of fructose diphosphate, triose phosphates and lactate. These changes were similar to those induced by ischemia in vivo brain. (Author)
AD-658 208 HC$3.00 MF$0.65

REPORT ON THIRD YEAR OF RESEARCH ON ASCORBIC ACID, BIOLOGICAL FUNCTION AND CHEMISTRY,
Colorado Univ Boulder Dept of Chemistry
For primary bibliographic entry see Field 6A.
AD-658 213 HC$3.00 MF$0.65

AMINO-ACID UPTAKE COMPARED IN MOTOR NEURONS, SPINAL CORD GREY MATTER, MUSCLE AND LIVER,
State Univ of New York Brooklyn Downstate Medical Center
H. Ford, and R. Rhines. 31 Mar 66, 10p
Contract Nonr-4018 (00), Grant PHS-NB-4568-02
Availability: Published in Journal of the Neurological Sciences v4 p501-10 1967.

Descriptors: (*Amino acids, *Nerve cells), Spinal cord, Muscles, Liver, Chromatographic analysis, Labeled substances, Tracer studies, Rats.

White male rats were injected intravenously with either (3H)lysine, (3H)tyrosine or (14C)glutamine. Uptake of labeled materials into ventral horn motor neurons dissected from the spinal cord grey matter, the spinal cord grey matter as a whole, liver and muscle was determined by liquid scintillation counting methods and the nature of the radioactive material present in the tissues was determined by ascending paper chromatography. The percentage of the injected dose of labeled material present per gram of dry tissue was always found to be highest in the ventral horn motor neurons. Muscle and spinal cord grey matter uptakes were much lower than liver, with muscle uptake being higher in lysine- and glutamine-injected rats and lower when tyrosine was the injected amino-acid. In all instances, some of the injected amino-acid was detected in the neural tissue by ascending paper chromatography. Following lysine injection, only lysine was present, while after glutamine and tyrosine, the various metabolites of these amino-acids were also detected. The high uptake in motor neurons relative to the low uptake in an area of spinal cord grey matter comparable to that from which such neurons were dissected is discussed in relation to the 'blood-brain barrier'. This comparison indicates the importance of comparing amino-acid uptakes between cell types rather than between organs of heterogenous structure. (Author)
AD-658 243 Not available from CFSTI.

NEUROSECRETORY ACTIVITY IN SUPRAOPTIC NUCLEUS OF NORMAL RATS,
Consejo Nacional de Investigaciones Cientificas Y Tecnicas Buenos Aires (Argentina)
David Zambrano, and Jose Mordoh. 24 Feb 66, 10p
AFOSR-67-2095
Grant AF-AFOSR-314-64
Availability: Published in Zeitschrift fuer Zellforschung v73 p405-13 1966.

Descriptors: (*Nerve cells, Secretion), Nuclei (Biology), Ingestion (Physiology), Granules, Histological techniques, Preservation, Argentina, Rats.

The secretory rhythm of neurosecretory cells was studied in supraoptic nuclei of normally drinking rats. Both nuclei were divided in five zones, and in each one, the nuclear and nucleolar volumes of 50 neurons were measured. Parallel observations were made on the Nissl material and neurosecretory granules. Comparative effects of different fixatives showed Carnoy and Zenker to be the best fluids for this type of investigation. Two extreme types of neurosecretory neurons with intermediary stages are observed. Type I neuron has a small nucleus and nucleolus, well developed Nissl bodies and a greater content of neurosecretory material. Type II has larger nucleus and nucleolus, scanty or packed Nissl bodies, and little Gomori positive material. The nuclear and nucleolar volumes differ between the different zones of the supraoptic nucleus and the zone of maximal activity varies in each particular case. To explain this asynchronic behavior a 'neurosecretory wave' of activity moving along the supraoptic nucleus is postulated. (Author)
AD-658 258 Not available from CFSTI.

ULTRASTRUCTURAL ASPECTS OF THE INHIBITION OF NEUROSECRETION BY PUROMYCIN,
Consejo Nacional de Investigaciones Cientificas Y Tecnicas Buenos Aires (Argentina)
David Zambrano, and Eduardo de Robertis. 6 Jun 66, 15p
AFOSR-67-2097
Grant AF-AFOSR-963-65
Prepared in cooperation with Buenos Aires Univ. (Argentina). Instituto de Anatomia General y Embriologia.
Availability: Published in Zeitschrift fuer Zellforschung v76 p458-70 1967.

Descriptors: (*Nerve cells, Secretion), Brain, Dehydration, Diet, Proteins, Biosynthesis, Inhibition, Histological techniques, Rats, Antibiotics, Argentina.
Identifiers: Puromycin.

The supraoptic nuclei and the infundibular process of the neurohypophysis were studied under the electron microscope in rats fed on dried food for 1 to 3 days and in similarly dehydrated animals but injected subarachnoidally with puromycin 4 to 24 hours prior to fixation. With 4 to 8 hours of puromycin the intracisternal filmentous material found in the control is greatly diminished. After 24 hours this inhibitory effect disappears in the perikaryon but the neurotubular material of the neuronal processes within the supraoptic nucleus and the neurosecretion in the infundibular process are greatly reduced. These results are discussed taking into consideration the inhibition of protein synthesis caused by puromycin and the neurosecretory cycle which characterizes the supraoptic neurons. (Author)
AD-658 275 Not available from CFSTI.

THE SECRETORY CYCLE OF SUPRAOPTIC NEURONS IN THE RAT. A STRUCTURAL-FUNCTIONAL CORRELATION,
Consejo Nacional de Investigaciones Cientificas Y Tecnicas Buenos Aires (Argentina)
David Zambrano, and Eduardo de Robertis. 24 Feb 66, 20p
AFOSR-67-2094
Grant AF-AFOSR-963-65
Availability: Published in Zeitschrift fur Zellforschung v73 p414-31 1966.

Descriptors: (*Nerve cells, Secretion), Brain, Dehydration, Ribosomes, Granules, Diet, Biosynthesis, Hormones, Rats, Argentina.

After perfusion with formaldehyde and glutaraldehyde the supraoptic nucleus and infundibular process of the neurohyopohysis of the rat were dissected and prepared for electronmicroscope observation. This study was carried out in specimens under normal water balance, in others fed on dry food and in rats submitted to forced hydration. Two extreme types of neurons with intermediary stages were recognized in the normal supraoptic nucleus. The main difference between them is in the content of ribosomes, development and dilatation of the vacuolar system and in the number of elementary neurosecretory granules. In both types lysosome-like particles are observed. The volume of the elementary granules increases 1.7 times along the hypothalamic-hypophyseal tract while the increase in the dense core of the granule is of the order of 4.3 times. After forty-eight hours on dry food there is a general depletion of secretory granules from the perikaryon and nearby axons, the ribosomes are numerous and the endoplasmic reticulum is dilated in all cells and contains a macromolecular filamentous material. With more prolonged dehydration the neurosecretory granules reappear in relation to the Golgi complex and the vacuolar system becomes progressively flattened. With forced hydration the number of granules in the perikaryon increases considerably. These observations are interpreted as indicative that the early stages of synthesis take place at the level of the ribosomes. The product, in a dilute macromolecular form, is transfered into the cisternae of the endoplasmic reticulum and then condensed into granules within the Golgi complex. (Author)
AD-658 276 Not available from CFSTI.

BRAIN STEM MECHANISMS OF SLEEP,
Siena Univ (Italy) Istituto Di Patologia Medica
Alberto Zanchetti. 1967, 22p
AFOSR-67-2102
Grants AF-EOAR-41-64, AF-EOAR-6-65

Availability: Published in Anesthesiology v28 n1 p81-99 Jan-Feb 1967.

Descriptors: (*Sleep, Electrophysiology), Brain, Electroencephalography, Nervous system, Physiology, Italy.
Identifiers: Wakefulness.

A discussion is presented of several aspects of sleep physiology with particular attention to the following topics: (1) ascending versus descending mechanisms in the active induction of light synchronized sleep; (2) active brain stem mechanisms responsible for deep, desynchronized sleep; (3) the functional significance of sleep. (Author)
AD-658 297 Not available from CFSTI.

NEURALE MECHANISMEN EMOTIONALEN VERHALTENS (Neural Mechanisms of Emotional Behavior),
Milan Univ (Italy) Istituto Di Patologia Medica
Alberto Zanchetti. Sep 67, 15p
AFOSR-67-2101
Grant AF-EOAR-6-65
Text in German.
Availability: Published in Verhandlungen der Deutschen Gesellschaft fur Kreislaufforschung v32 p46-57 1966.

Descriptors: (*Emotions, Psychophysiology), Nervous system, Behavior, Cardiovascular system, Hypertension, Blood circulation, Blood pressure, Brain, Stimulation, Environment, Electrophysiology, Italy.
Identifiers: Sham rage behavior.

A discussion is presented of the neural mechanisms of emotional behavior with particular attention to the following topics: (1) Circulatory changes during emotional behavior; (2) Diencephalic and reticular mechanisms of sham rage; (3) How the environment can influence emotional behavior; (4) Circulatory derangements caused by prolonged or repeated emotional stimuli. (Author)
AD-658 299 Not available from CFSTI.

ROLE DU THALAMUS MEDIAN DANS L'ETABLISSEMENT ET LA RETENTION DE CONDITIONNEMENTS DEFENSIFS, CLASSIQUES ET INSTRUMENTAUX (The Role of the Thalamus Median in the Establishment and the Retention of Conditioned Defenses, Classical and Instrumental),
Ohio State Univ Columbus Electroscience Lab
J. Delacour, and M. P. Santacanade de Martinez.
8 Feb 67, 20p
AFOSR-67-2114
Grant AF-EOAR-40-67
Text in French.
Availability: Published in Neuropsychologia v5 p237-52 1967.

Descriptors: (*Defense mechanisms (Psychology), *Thalamus), Reaction (Psychology), Conditioned reflex, Retention, Psychophysiology, Rats, France.

In the rat, lesion of the Centre-Median and Parafascicular thalamic nuclei markedly alters the acquisition and retention of an 'active' defensive reaction, tested in a Mowrer-Miller box. This effect is less striking when there is a long interval (15 sec) between the conditioned (visual) and unconditioned (electric shock) stimuli, than when the interval is short (5 sec.). However, the lesion does not hinder the acquisition of a vegetative defensive reaction (change in cardiac rhythm). These results suggest that Centre-Median and Parafascicular nuclei exert a particularly important control on the instrumental components of the 'active' defensive reaction in rats. (Author)
AD-658 305 Not available from CFSTI.

IS THE CELL MEMBRANE A UNIVERSAL RATE-LIMITING BARRIER TO THE MOVEMENT OF WATER BETWEEN THE LIVING CELL AND ITS SURROUNDING MEDIUM,
Arizona Univ Tucson Dept of Metallurgical Engineering
Gilbert N. Ling, Margaret M. Ochsenfeld, and George Karreman. 13 Jan 66, 14p
Contract Nonr-4371 (00), Grant NSF-GB-2637
Prepared in cooperation with Pennsylvania Univ., Philadelphia, School of Medicine.
Availability: Published in The Journal of General Physiology v50 n6 Pt1 p1807-20 1967.

Descriptors: (*Membranes (Biology), Permeability), Tritiated compounds, Labeled substances, Eggs, Amphibians, Water, Diffusion, Transport properties, Cells (Biology).
Identifiers: Cell membranes.

A newly introduced technique, the 'influx profile analysis,' was used to study the diffusion of tritiated water in and out of frog ovarian eggs at 25C. The results show that the rate-limiting step in the exchange of labeled water is not permeation through the cell membrane but diffusion in the bulk of the intracellular water. (Author)
AD-658 411 Not available from CFSTI.

MEASUREMENT OF WATER DISPLACEMENT IN MAN UNDER PHYSIOLOGICAL AND SOME PATHOLOGICAL STATES.
Messungen Von Wasserverschiebungen Im Menschen Unter Physiologischen Und Einigen Pathologischen Zustaenden
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Medizin.
H. R. Scholz. Mar 67, 105p JUL-471-ME
in German

Descriptors: *Body fluid, *Human body, *Radiobiology, *Water content, Bibliography, Body, Cell, Content, Experiment, Fluid, Human, Iodine, Loss, Medicine, Pathology, Physiology, Tracer, Tritium, Water, Weight.

For abstract, see STAR 05 20.
N67-34294 HC$3.00 MF$0.65

A STUDY OF PHYSIOLOGICAL MECHANISMS AND INTER-RELATIONS BETWEEN SYSTEMIC AND REGIONAL BLOOD VOLUME, BLOOD FLOW AND ELECTROLYTE BALANCE INTERIM PROGRESS REPORT.
Harvard Univ., Boston, Mass. Thorndike Memorial Lab.
W. H. Abelmann, and L. E. Earley. 30 Jun 67, 8p
NASA-CR-65675
Grant NSG-595

Descriptors: *Blood flow, *Circulatory system, *Hemodynamic response, *Physiological response, Balance, Blood, Cardiovascular, Circulation, Dog, Electrolyte, Flow, Hemodynamic, Human, Physiology, Response, Sodium, System, Volume, Water.

For abstract, see STAR 05 20.
N67-34702 HC$3.00 MF$0.65

MOCK CIRCULATORY SYSTEM.
Hydrospace Research Corp., Rockville, Md.
For primary bibliographic entry see Field 6L.
PB-175 719 HC$3.00 MF$0.65

6Q. Protective Equipment

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART II.
Monsanto Research Corp., Dayton, Ohio.
For primary bibliographic entry see Field 11G.
AD-460 379 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION.
Monsanto Research Corp., Everett, Mass. Boston Lab.
For primary bibliographic entry see Field 11G.
AD-463 014 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART I.
Monsanto Research Corp., Everett, Mass.
For primary bibliographic entry see Field 11G.
AD-463 041 HC$3.00

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED AIRCREWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS: (COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTOR AND THREE SUSPENSION SYSTEMS).
Technical rept.,
Army Natick Labs Mass Pioneering Research Div
Richard L. Burse. Jan 67, 28p Rept no. EPR-14
USA-NLABS-TR-68-4-PR

Descriptors: (*Body armor, *Human engineering), (*Aviation personnel, Body armor), Design, Acceptability, Flight clothing, Anthropometry.

The research described was an evaluation of body-supported aircrewmen's buttocks and crotch protective units in which two heights of crotch protector and three different suspension systems were compared with respect to fit, comfort, ease of use, estimated length of time the system could be used and the adequacy of several dimensions of the protective units. In general, both types of protective units and all three suspension systems were equally satisfactory. One type of suspension system and one height of crotch protector were significantly easier to use, however, while both crotch protectors were too wide. Subjects desired that the longer crotch protector be shortened and the shorter crotch protector be lengthened to approximately the same length. This desired change apparently was based on factors other than physical discomfort. (Author)
AD-658 034 HC$3.00 MF$0.65

PRESSURE SEALING CLOSURES FOR FULL PRESSURE PROTECTIVE SUIT ASSEMBLIES.
Final rept. 15 Jul 66-10 Feb 67,
Northrop Space Labs Hawthorne Calif
Roger M. Heitz, and Gary G. Brown. Jun 67, 62p
Rept no. NSL-67-177
AMRL-TR-67-59
Contract AF 33 (615)-5372

Descriptors: (*Pressure suits, *Fastenings), (*Gas seals, Pressure suits), Design, Manufacturing methods, Molding.

Longitudinal and circular pressure sealing closures were designed and developed for full pressure protective assemblies from a design concept provided by the Aerospace Medical Research Laboratories, invention disclosure number 66/588. This study consisted of (1) designing pressure closure devices, (2) selecting suitable materials for the fabrication of the sealing closure parts and the cylinders to include the closures, (3) selecting an appropriate fabrication process for the closure sealing parts, and (4) fabricating and testing the breadboard and demonstration models containing either the circular or longitudinal closures. An EPDM elastomeric material was found to be suitable for the fabrication of the closure sealing parts which were molded using an established molding technique. The fabricated breadboard and demonstration models passed successfully the required tests wherein leak rates were determined from 0 to 5 psig, and exposure to pressure up to 12 psig, were performed. (Author)
AD-658 204 HC$3.00 MF$0.65

A RESEARCH STUDY TO DEFINITIZE A BIOISOLATOR SUIT SYSTEM (BISS) FINAL REPORT.

General Electric Co., Philadelphia, Pa. Missile and Space Div.
25 Aug 67, 573p NASA-CR-66441, DOC.-67SD888
Contract NAS1-6537

Descriptors: *Environmental chamber, *Isolator, *Spacecraft sterilization, *Suit, Assembly, Biological, Chamber, Environment, Facility, Spacecraft, Sterilization.

For abstract, see STAR 05 20.
N67-34812 HC$3.00 MF$0.65

6R. Radiobiology

CLONAL REPOPULATION IN RETICULAR TISSUES OF X-IRRADIATED MICE: EFFECT OF DOSE AND OF LIMB-SHIELDING,
Naval Radiological Defense Lab San Francisco Calif
Peter C. Nowell, and Leonard J. Cole. 30 Aug 67, 23p Rept no. USNRDL-TR-67-79

Descriptors: (*Radiation effects, *Chromosomes), (*Hemopoietic system, Radiation effects), Whole body irradiation, Radiological dosage, Tissues (Biology), Regeneration, Lymphatic system, Thymus, Shielding, X rays, Extremities, Growth, Anomalies, Mice.

Chromosome studies in irradiated mice have indicated that following high sublethal whole-body exposure regeneration of the reticular tissues occurs in a clonal fashion. With increasing doses, from 100 to 700 rads, these organs appeared to be repopulated from fewer and fewer surviving stem cells. In a few instances at the highest dose, the progeny of the same cell apparently differentiated to marrow cells at one site and lymphoid cells in others, suggestive evidence of a totipotent hematopoietic stem cell in the adult mouse. Chromosome studies in mice receiving 900 rads with one limb shielded have indicated repopulation of the thymus and other reticular tissues by undamaged cells from the shielded marrow. Such marrow-derived cells, perhaps by restoring immunological competence or by nonimmunological contact inhibition, could account for the known effect of limb shielding in reducing the incidence of radiation-induced thymic lymphomas. (Author)
AD-657 609 HC$3.00 MF$0.65

LASER INJURY IN SKIN,
Armed Forces Inst of Pathology Washington D C
For primary bibliographic entry see Field 6E.
AD-657 880 Not available from CFSTI.

THE INFLUENCE OF IRRADIATION ON NEISSERIA MENINGITIDIS L-FORM INFECTION IN MICE.
Annual progress rept. 1 Apr 66-30 Mar 67,
Mary Imogene Bassett Hospital, Cooperstown, N. Y.
Malcolm I. Page. 30 Jan 67, 12p
Contract DA-49-193-MD-2920

Descriptors: (*Neisseria meningitidis, Whole body irradiation), (*Infectious diseases, Radiation effects), Infections, Mice, Pathology, Blood, Survival, Growth, Septicemia.

The pathogenicity of a strain of Neisseria meningitidis derived from a reverted L-form is compared with its parent bacterium. Both strains produced lethal infections in mice but 20 micrograms of penicillin failed to uniformly protect mice against death due to the reverted strain as it did with the parent strain. Total body irradiation increased the fatality rates and prolonged the bacteremias following infection with both strains. Autopsy cultures failed to yield either organism after recovery from bacteremia. Irradiation of mice after recovery from infection with both strains failed to induce recurrent bacteremia. Stabilization of the L-form occurred during these studies, and stable L-forms were found to persist in the tissue of normal mice for at least 5 days. (Author)
AD-806 604 HC$3.00 MF$0.65

PROCEEDINGS OF THE 12TH ANNUAL BIOASSAY AND ANALYTICAL CHEMISTRY MEETING HELD AT GATLINBURG, TENNESSEE, OCTOBER 13-14, 1966,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
C. M. West. 6Jun 67, 234p
Contract W-7405-eng-26

Descriptors: (*Health physics, *Lungs), (*Biological assay, *Radioactivity), Radiobiology, Bremsstrahlung.

For abstract, see NSA 21 18.
CONF-661018 HC$3.00 MF$0.65

TABULATED VALUES OF EXPERIMENTALLY DETERMINED DIFFERENTIAL ENERGY AND ANGLE SPECTRA FOR 137 CS GAMMA RAYS IN WATER AND AIR,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
For primary bibliographic entry see Field 7D.
For abstract, see NSA 21 17.
HASL-187 HC$3.00 MF$0.65

PERSONNEL RADIO-FREQUENCY RADIATION MONITOR,
Los Alamos Scientific Lab., N. Mex.
Frederic L. Fey, Jr. 9 Jun 67, 5p
Contract W-7405-eng-36

Descriptors: (*Radiation monitors, Personnel), (*Health physics instrumentation, *Radiation measurement systems), Radiofrequency, Detectors, Calibration.

For abstract, see NSA 21 18.
LA-3722 HC$3.00 MF$0.65

MANUAL OF STANDARD PROCEDURES,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
NYO-4700 HC$3.00 MF$0.65

THE DETERMINATION OF STRONTIUM 90 IN ENVIRONMENT MATERIALS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 05 20.
N67-34081 HC$3.00 MF$0.65

DESIGN OF A PORTABLE INSTRUMENT FOR MEASURING THE RADIOACTIVE CONTAMINATION OF FOODSTUFFS.
Etude D'un Instrument Portatif pour La Mesure de La Contamination Radio-active des Aliments Centre D Etude de L Energie Nucleaire, Mol (Belgium).
R. Boulenger. Jun 67, 77p EUR-3265.F
Contract EURATOM-020-65-D6 PSTB

Descriptors: *Food, *Nuclear radiation, *Portability, *Radioactive contamination, Accident, Contamination, Design, Instrument, Measurement, Nuclear, Probe, Radiation, Radioactivity, Scintillation.

For abstract, see STAR 05 20.
N67-34090 HC$3.00 MF$0.65

MEASUREMENT OF WATER DISPLACEMENT IN MAN UNDER PHYSIOLOGICAL AND SOME PATHOLOGICAL STATES.
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Medizin.
For primary bibliographic entry see Field 6P.
For abstract, see STAR 05 20.
N67-34294 HC$3.00 MF$0.65

TISSUE CURRENT-TO-DOSE CONVERSION FACTORS FOR NEUTRONS WITH ENERGIES FROM 0.5 TO 60 ME V.
Oak Ridge National Lab., Tenn.
R. G. Alsmiller, Jr., D. C. Irving, and H. S. Moran. Aug 67, 90p NASA-CR-87480, ORNL-4032
Contract NASA ORDER R-104, W-7405-ENG-26

Descriptors: *Fast neutron, *Monte carlo method, *Radiation hazard, Computer program, Current, Deposition, Dose, Elastic, Energy, Exposure, Hazard, Health, Interaction, Neutron, Physics, Radiation, Radiobiology, Tissue.

For abstract, see STAR 05 20.
N67-34951 HC$3.00 MF$0.65

STUDIES OF LIVER AND GASTROINTESTINAL TRACT IRRADIATED WITH PROTONS PROGRESS REPORT.
Baylor Univ., Houston, Tex. Coll. of Medicine.
1967, 24p NASA-CR-87513
Contract NGR-44-003-018

Descriptors: *Biological cell, *Gastrointestinal system, *Liver, *Proton irradiation, Animal, Biological, Cell, Damage, Degeneration, Effect, Electron, Epithelium, Gastrointestinal, Irradiation, Microscopy, Mitochondria, Proton, Radiation, Radiation effect, System.

For abstract, see STAR 05 20.
N67-35124 HC$3.00 MF$0.65

A SOURCE ARRANGEMENT FOR A LOW-EXPOSURE-RATE TOTAL-BODY IRRADIATION FACILITY FOR MAN.
Oak Ridge Associated Universities, Tenn.
For primary bibliographic entry see Field 6B.
For abstract, see STAR 05 20.
N67-35130 HC$3.00 MF$0.65

COMPARISONS OF RESULTS OBTAINED WITH SEVERAL PROTON PENETRATION CODES,
Oak Ridge National Lab., Tenn.
Wayne W. Scott, and R. G. Alsmiller, Jr. Jul 67, 27p
Contract W-7405-eng-26

Descriptors: (*Reactor shielding materials, *Reactor shielding calculations), (*Protons, Penetration), Programming (Computers), Dose rate, Charged particles.

For abstract, see NSA 21 18.
ORNL-RSIC-17 HC$3.00 MF$0.65

ESTIMATES OF PRIMARY AND SECONDARY PARTICLE DOSES BEHIND ALUMINUM AND POLYETHYLENE SLABS DUE TO INCIDENT SOLAR-FLARE AND VAN ALLEN BELT PROTONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 18.
ORNL-RSIC-18 HC$3.00 MF$0.65

RADIATION DOSIMETRY STUDIES AT THE HEALTH PHYSICS RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.

D. R. Johnson, and J. W. Poston. Jun 67, 70p
Contract W-7405-eng-26

Descriptors: (*Research reactors, *Health physics), (*Dosimeters, Proportional counters), Radiation measurement systems.

For abstract, see NSA 21 17.
ORNL-4113 HC$3.00 MF$0.65

DISTRIBUTION OF COBALT 60, ZINC 65, STRONTIUM 85, AND CESIUM 137 IN A FRESHWATER POND,
National Center for Radiological Health, Rockville, Md.
William A. Brungs, Jr. Mar 67, 64p
PHS-Pub-999-RH-24

Descriptors: (*Lakes, *Radiological contamination), (*Radioactive waste, Distribution), Accidents, Radioactive isotopes, Cobalt, Zinc, Strontium, Cesium, Water, Radioactivity, Ecology, Aquatic animals, Tissues (Biology), Plankton, Decontamination.

Data were obtained on the physical, chemical, and ecological distribution of four radionuclides added to a small pond. The conditions were comparable to those in an accidental release of radionuclides to an impoundment. Cobalt 60, zinc 65, strontium 85, and cesium 137 were added to a 30,000-gallon pond, with a sand substrate, and containing experimental biota. After 4 days, 10 percent of the cobalt 60, 6 percent of the zinc 65, and 5 percent of the cesium 137 remained in solution. Cobalt 60 and zinc 65 were associated principally with suspended solids, and cesium 137 with bottom sediments. In general, soft parts of biota rapidly accumulated more radionuclides than hard parts, but gradually lost radioactivity as radionuclide concentrations in the water decreased. Clam and snail shells and fish bone usually accumulated zinc 65 and strontium 85 until almost the end of the experiment. The maximum observed accumulation of strontium 85 occurred in the crayfish exoskeleton. Maximum activities of the other test radionuclides were observed in the tadpoles.
PB-175 707 HC$3.00 MF$0.65

COMBINED SUBJECT AND AUTHOR INDEXES TO RADIOBIOLOGY BIBLIOGRAPHIES TID-3097, BIOLOGICAL EFFECTS OF IONIZING RADIATION AND TID-3098, THE EFFECTS OF RADIATION AND RADIOISOTOPES ON THE LIFE PROCESSES,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
William E. Bost, Helen L. Ward, and Hugh E. Voress. Jun 67, 695p

Descriptors: (*Radiobiology, Bibliographies), (*Radioactive isotopes, Radiation effects), Indexes, Subject indexing.

For abstract, see NSA 21 17.
TID-3099 HC$3.00 MF$0.65

AIR-BORNE RADIOACTIVITY IN FALLOUT AREAS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 18.
UCLA-12-628 HC$3.00 MF$0.65

EFFECTS OF 5-FLUOROURACIL ON NORMAL SHEEP,
California Univ., Livermore. Lawrence Radiation Lab.
Theodore C. Merkle, David W. Wilbur, and John Rehder. 13 Apr 67, 15p
Contract W-7405-eng-48

Descriptors: (*Mammals, Drugs), (*Cancer, Chemotherapy), Dosage, Dose rate, Monitors, Blood counts, Chemotherapeutic agents, Erythrocytes.

For abstract, see NSA 21 17.
UCRL-50242 HC$3.00 MF$0.65

POWERED AIR-PURIFYING RESPIRATOR,
California Univ., Livermore. Lawrence Radiation Lab.
William A. Burgess, and William Nettleton. 23 May 67, 13p
Contract W-7405-eng-48

Descriptors: (*Air, Purification), (*Respirators, *Protective masks), Protective mask filters, Power supplies, Batteries + components.

For abstract, see NSA 21 17.
UCRL-50263 HC$3.00 MF$0.65

6S. Stress Physiology

SYNTHESIS OF ATROPINE LABELED WITH C14 IN THE TROPINE RING AND EFFECT OF COLD ACCLIMATION ON ATROPINE METABOLISM.
Pittsburgh Univ Pa School of Medicine
For primary bibliographic entry see Field 6O.
AD-657 787 HC$3.00 MF$0.65

CARDIOPULMONARY RESPONSES OF RESTING MAN DURING EARLY EXPOSURE TO HIGH ALTITUDE,
Army Medical Research and Nutrition Lab Denver Colo Physiology Div
James A. Vogel, and Charles W. Harris. 20 Jan 67, 7p
Availability: Published in Journal of Applied Physiology v22 n6 p1123-8 Jun 1967.

Descriptors: (*Acclimatization, High altitude), Hypoxia, Cardiovascular system, Responses, Relaxation (Physiology), Heart, pH, Blood pressure, Blood circulation, Adaptation (Physiology), Stress (Physiology).

Sixteen young male subjects were exposed to simulated altitudes of 2,000, 11,000, and 15,000 ft in a hypobaric chamber and studied at sitting rest after 10, 20, 30, and 40 hr of exposure. Of those measurements made, only PaO2 changed significantly with time of exposure. Cardiac output rose from 71 at 2,000 ft to 84 and 123 ml/min per kg at 11,000 and 15,000 ft, respectively. This was due to significant increases in heart rate at both higher elevations with no alteration in stroke volume. Mean arterial blood pressure was unaltered and, therefore, peripheral resistance fell concomitant with the rise in cardiac output. Mean PaO2 for the three altitudes was 94, 63, and 44 mm Hg; and percent SaO2 99, 92, and 79. Largest changes in PaCO2 and pH were observed between 2,000 and 11,000 ft and much less between 11,000 and 15,000 ft. Changes in cardiac output appeared best related to alterations in arterial O2 content or saturation rather than tension, suggesting a peripheral rather than a central origin for the stimulus for the cardiovascular response to high altitude. The cardiac output response appears to follow an exponential relationship with altitude. (Author)
AD-657 823 Not available from CFSTI.

CHANGES IN PLASMA THYROXINE CONCENTRATION AND METABOLISM, CATECHOLAMINE EXCRETION AND BASAL OXYGEN CONSUMPTION IN MAN DURING ACUTE EXPOSURE TO HIGH ALTITUDE.
Revised ed.,
Colorado Univ Denver Dept of Medicine
Martin I. Surks, Henry J. Beckwitt, and Charles A. Chidsey. 8 Feb 67, 12p
Grant PHS-HE-09932-1
Revision of manuscript submitted 2 Sep 66. Research supported in part by ARPA. Prepared in cooperation with Army Medical Research and Nutrition Lab., Denver, Colo.
Availability: Published in The Journal of Clinical Endocrinology and Metabolism v27 n6 p789-99 Jun 1967.

Descriptors: (*Metabolism, High altitude), Thyroxine, Amines, Excretion, Oxygen consumption, Stress (Physiology), Degradation, Levarterenol, Epinephrine, Exposure, Adaptation (Physiology).

Plasma total and free thyroxine concentration, thyroxine turnover, catecholamine excretion and basal oxygen consumption were measured in 5 young male subjects during a control period at 5280 feet altitude and for 8 days at 14,100 feet (Pikes Peak, Colorado). Turnover data were analyzed in a manner enabling the calculation of daily rates of thyroxine degradation during the experimental period. Thyroxine degradation was increased during the first 3 days at high altitude and thereafter remained slightly elevated. Mean basal oxygen consumption increased from 125 to 147 ml per min per m2 on the first day at high altitude and then progressively decreased toward the control value. Plasma total and free thyroxine concentration and norepinephrine excretion were not altered during the first 2 days at altitude but then increased continually for the remainder of altitude exposure. Epinephrine and total metanephrine excretion were unchanged but the increased sympathetic activity was reflected by an increase in the excretion of vanilmandelic acid. The temporal association between the initial hypermetabolism and increased thyroxine degradation at altitude suggests that these changes may be causally related. The later alterations in sympathetic activity and circulating thyroxine concentrations may play a role in the adaptation to more prolonged exposure to this environment. (Author)
AD-657 825 Not available from CFSTI.

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS: PERFORMANCE AND CARDIOVASCULAR EVALUATION,
Army Medical Research and Nutrition Lab Denver Colo
C. Frank Consolazio, Richard A. Nelson, Herman L. Johnson, LeRoy O. Matoush, and Harry J. Krzywicki. 1967, 10p
Availability: Published in The American Journal of Clinical Nutrition v20 n7 p684-93 Jul 1967.

Descriptors: (*Starvation, Metabolism), Oxygen consumption, Training, Respiration, Body temperature, Barometric pressure, Physical fitness, Electrocardiography, Electroencephalography, Stress (Physiology), Pulse rate, Cardiovascular system.

Six healthy, normal adult males between the ages of 21 and 52 years fasted for a period of 10 days under conditions where water was available ad libitum. Basal oxygen uptakes (Vo2) in milliliters per minute and milliliters per kilogram body weight per minute corrected to standard conditions were significantly decreased during the fasting period. In submaximal work on the treadmill Vebtps and Vo2 in milliliters per minute and milliliters per kilogram per minute were significantly decreased during the fasting and rehabilitation periods, indicating a training effect. Maximal oxygen uptakes in milliliters per kilogram per minute were decreased during fasting, but the decrease was not statistically significant. Other maximal work measurements Vebtps, pulse rates and kilogram-meters of work per minute were also reduced in comparison to the control values, indicating a training effect. Electrocardiograms were significantly abnormal during the fasting phase and are considered to reflect a severe stress. One of the six subjects developed an abnormal electroencephalogram and was immediately removed from the study. Although physical performance was not significantly impaired during a 10-day starvation period, com-

plete fasting without mineral supplementation is not recommended for troops on combat patrol. (Author)
AD-657 827 Not available from CFSTI.

METABOLIC ASPECTS OF ACUTE STARVATION IN NORMAL HUMANS (10 DAYS),
Army Medical Research and Nutrition Lab Denver Colo
C. Frank Consolazio, LeRoy O. Matoush, Herman L. Johnson, Richard A. Nelson, and Harry J. Krzywicki. 1967, 12p
Availability: Published in The American Journal of Clinical Nutrition v20 n7 p672-83 Jul 1967.

Descriptors: (*Starvation, Metabolism), Diet, Dehydration, Nitrogen, Excretion, Urine, Proteins, Minerals, Electrocardiography, Electroencephalography, Stress (Physiology), Vitamins, Metabolic diseases.

The effects of starvation were evaluated on six normal, healthy adults during a 10-day period of complete starvation. Three undesirable problems related to fasting were encountered. These were: (a) the great body water loss resulting in body hypohydration; (b) the fairly large urinary nitrogen excretion showing that body protein was being catabolized; and (c) the fairly large mineral losses concomitant with the large body water loss. Also, abnormalities in electrocardiograms and one electroencephalogram were observed during the latter stages of starvation. These factors reflecting a severe stress could eventually lead to greatly impaired mental and physical inefficiency. At the end of 10 days of starvation, the men were in very poor condition both physically and mentally. There appeared to be increased weakness and apathy toward mental and physical work. They had frequent lapses of memory, were not at all mentally alert, were slow to respond to questions, were tired, pale and haggard, and had indications of muscle cramps, which may have been due to salt restriction and depletion of body stores. It is suggested that complete fasting without mineral or vitamin supplementation should not be recommended either for a soldier on combat patrol or for a reducing diet. (Author)
AD-657 828 Not available from CFSTI.

RELATIONS BETWEEN VESTIBULAR NYSTAGMUS AND VISUAL PERFORMANCE.
Naval Aerospace Medical Inst Pensacola Fla
For primary bibliographic entry see Field 6N.
AD-657 847 HC$3.00 MF$0.65

THE RELATIONSHIP BETWEEN THE RADIOBIOLOGICAL EFFECTS TABLE AND TACTICAL MILITARY RADIATION MEASUREMENT SYSTEM DESIGN,
Naval Radiological Defense Lab San Francisco Calif
K. F. Sinclair. 29 May 67, 34p Rept no. USNRDL-TR-67-67

Descriptors: (*Dosimeters, Design), (*Radiation effects, Tables), Radiation measurement systems, Neutron detectors, Gamma counters, Calibration, Errors, Configuration.

The Radiobiological Effects Table (RET) and the radiac are two inseparable components of a system, and care must be exercised in the design of both if a satisfactory result is to be obtained. There are a number of different ways of constructing the effects table and calibrating the radiac that will result in satisfactory operation of the system. Unfortunately, the present approach, i.e., stating the RET in terms of exposure in roentgens or absorbed dose in rads (air) and calibrating the radiac so that it indicates properly in a free air point source geometry, automatically results in errors on the order of 50 percent for gamma dosimeters and ratemeters and an overstatement of the neutron dose by a factor ranging from 2 to 6 for developmental neutron dosimeters. Correlating biological effects with midline dose for the RET and retaining the present calibration procedure improves the situation considerably for gamma measurements; but for the neutron dosimeter, the biological effectiveness of neutrons as a function of energy must be taken into account during design if neutron and gamma dose are to be commensurate. (Author)
AD-657 932 HC$3.00 MF$0.65

AEROMEDICAL MONITORING OF NAVAL AVIATORS DURING AIRCRAFT CARRIER COMBAT OPERATION,
Dunlap and Associates Inc Santa Monica Calif Western Div
Frank H. Austin, Jr., Thomas J. Gallagher, Clyde A. Brictson, B. David Polis, and Charles E. Lewis, Jr. 1967, 6p
NAVMED-MF011.99-1004-14
Contract Nonr-4984 (00)
Prepared in cooperation with Software Systems, Inc., under contract NASw-1467.
Availability: Published in Aerospace Medicine v38 n6 p593-6 Jun 1967.

Descriptors: (*Pilots, Medical examination), (*Aviation medicine, Stress (Physiology)), Aerial warfare, Electrocardiography, Respiration, Acceleration, Blood chemistry, Urine, Hormones, Carrier landings, Performance (Human), Phospholipids, Statistical analysis, Naval aviation, Monitors.

A team of Navy and NASA personnel monitored Navy carrier pilots flying high-rish attack combat missions in North Viet Nam during a 22-day line period near the end of a seven-month deployment. During the first 10 days, ECG, respiration and acceleration were recorded in flight on 32 pilots. Samples of pre- and post-flight blood and urine were collected for biochemical analysis for stress hormones and other fractions. Landing performance was recorded from radar tracking and carrier approaches. Results of the cardiorespiratory response is reported in a separate paper. The phosphatidyl glycerol fraction of the plasma phospholipids became elevated during the combat period, as did the phosphatidic acid, while the cardiolipin level remained relatively constant. These changes plotted against time in combat indicated a characteristic biochemical response pattern for combat flying stress. Statistical analysis of the designated phospholipid components showed significant concentration changes in the combat pilots in contrast to that previously found in other stress states and in normal controls. Analysis of the landing data of the monitored pilots showed a mean performance for the group which compared closely to the performance of pilots flying similar aircraft (A4E). (Author)
AD-657 987 Not available from CFSTI.

EFFECTS OF DIET AND ALTITUDE ON GROWTH AND FOOD INTAKE OF RATS,
Army Medical Research and Nutrition Lab Denver Colo
Kenneth S. K. Chinn, Roy F. Burlington, John P. Hannon, George J. Klain, and J. L. Shields. Jul 67, 18p Rept no. USAMRNL-307

Descriptors: (*Nutrition, High altitude), Diet, Rats, Carbohydrates, Fats, Proteins, Food, Ingestion (Physiology), Metabolism, Growth, Stress (Physiology).

The effects of three diets (high-carbohydrate, high-fat and high-protein) and two altitudes (11,400 ft. and 14,110 ft.) on growth and food consumption of young growing rats were studied. Growth was slightly depressed at 11,400 feet and markedly ($P < 0.001$) depressed at 14,110 feet. Rats appeared to grow better at both altitudes when fed a high-fat diet. The type of diet, however, is not a major factor affecting growth at high altitude. Food consumption was significantly ($P<0.001$) depressed at 11,400 feet but no differences in food utilization were observed. On the other hand, food consumption was decreased ($P<0.05$) at 14,110 feet in rats fed a high-protein or high-carbohydrate diet but not in rats fed a high-fat diet. However, food utilization was significantly ($P<0.001$) decreased. It appears likely that depressed growth at high altitude can be traced to metabolic derangement resulting from the combined factor of diet and altitude. (Author)
AD-658 070 HC$3.00 MF$0.65

THE MILITARY APPLICABILITY OF RESEARCH ON QUANTITATION OF STRESS BY CATECHOL AMINE ANALYSIS.
Federation of American Societies for Experimental Biology Bethesda Md Life Sciences Research Office
For primary bibliographic entry see Field 6A.
AD-658 232 HC$3.00 MF$0.65

DECOMPRESSION SICKNESS IN HIGH-ALTITUDE FLIGHT,
School of Aerospace Medicine Brooks AFB Tex
Willard L. Meader. Mar 67, 7p Rept no. SAM-TR-66-305
Availability: Published in Aerospace Medicine v38 n3 p301-3 1967.

Descriptors: (*Decompression sickness, High altitude), (*Aviation medicine, Decompression sickness), Flight crews, Etiology, Extremities.

Review of 5 years of a WU-2 squadron's daily records shows 36 cases of decompression sickness entirely confined to reports of bends pain among 11 crewmembers in 958 flights. Generally, 40 minutes were spent in denitrogenation in a partial pressure suit and helmet before achieving cabin altitudes of close to 29,000 feet. The majority of bends occurred within the first 3.5 hours affecting the knee joints in almost two-thirds of the cases with a tendency to recur at the same joint. Only 1 case required descent to lower altitude to afford relief from pain. (Author)
AD-658 348 Not available from CFSTI.

AEROSPACE MEDICINE AND BIOLOGY - A CONTINUING BIBLIOGRAPHY, WITH INDEXES, JUNE 1967.
National Aeronautics and Space Administration, Washington, D. C.
Jul 67, 169p NASA-SP-7011/39/

Descriptors: *Aerospace medicine, *Bibliography, *Biology, Abstract, Aerospace, Atmosphere, Earth, Environment, Flight, Medicine, Physiology, Psychology, Simulation, Space.

For abstract, see STAR 05 20.
N67-34433 HC$3.00 MF$0.65

FEASABILITY STUDY OF NONINVASIVE VENOUS PRESSURE MEASUREMENT.
Biosystems, Inc., Cambridge, Mass.
E. O. Attinger, R. F. Brubaker, J. Pines, D. M. Worthen, and L. R. Young. Apr 67, 266p NASA-CR-87444
Contract NASW-1559

Descriptors: *Blood pressure, *Pressure measurement, *Vein, *Weightlessness, Bibliography, Blood, Chamber, Digital, Feasibility, Measurement, Occlusion, Plethysmogram, Pressure, Technique.

For abstract, see STAR 05 20.
N67-34451 HC$3.00 MF$0.65

THE EFFECT OF POSITIVE ACCELERATION UPON PULMONARY ARTERY PRESSURE IN MAN.
Flying Personnel Research Committee, London (England).
D. H. Glaister, and P. Howard. Apr 66, 19p
FPRC/1251

Descriptors: *Acceleration tolerance, *Artery, *Human body, *Pressure drop, *Pulmonary circulation, Acceleration, Blood, Body, Capillary, Circulation, Diastolic, Distribution, Drop, Exposure, Flow, Human, Hydrostatic, Index, Lung, Measurement, Physiology, Positive, Prediction, Pressure, Pulmonary, Stress, System, Systolic, Tolerance, Vascular.

For abstract, see STAR 05 20.
N67-34914 HC$3.00 MF$0.65

6T. Toxicology

AN EVALUATION OF THE NEPHROTOXICITY OF ETHYLENE DIAMINE TETRAACETATE AND DIETHLYENE TRIAMINE PENTAACETATE IN THE RAT,
Naval Medical Research Inst Bethesda Md
Paul D. Doolan, Sorell L. Schwartz, Jude R. Hayes, John C. Mullens, and Nancy B. Cummings. 19 Dec 66, 22p
Availability: Published in Toxicology and Applied Pharmacology v10 n3 p481-500 May 1967.

Descriptors: (*Ethylenedinitrilo tetraacetates, Toxicity), (*Kidneys, Pathology), Chelate compounds, Metals, Calcium, Dosage, Histology, Excretion, Metal poisoning, Labeled substances, Rats.
Identifiers: Diethylene triamine pentaacetate, Sequestering agents.

Clinical reports and certain experimental studies have indicated that ethylene diamine tetraacetate and diethylene triamine pentaacetate are nephrotoxic. Since these compounds have a very high order of physiologic and biochemical specificity, studies were performed in the expectation that insights of a mechanistic nature might be obtained. It was found that the tubular vacuolization produced in the rat by intraperitoneal injection of the chelates daily for 10 days was not accompanied by significant elevation of serum creatinine or urea nitrogen. In addition, there was no impairment in renal excretion of the 14C-labeled chelates or in the ability of slices of the renal cortex to accumulate p-aminohippurate. The results with labeled compounds indicated that the vacuoles were not simple repositories of accumulated chelate, and metal analyses of the kidney indicated that vacuolization could occur independent of changes in the metal spectrum. Kidneys with preexisting or evolving damage due to vitamin D2 or lead intoxication did not appear to be more vulnerable to the action of the chelates. Advice to the effect that renal function should be followed in patients receiving these chelates is consistent with good medical practice, but the label 'nephrotoxin' is unjustified. There are similarities between the vacuoles produced by these chelates and those observed with sucrose and mannitol. The driving forces in these morphologic events appear to center on the moiety of these materials that gain entrance to the cell rather than on the number of osmotically active particles in the filtrate or urine volume. Observations and thoughts concerning the origin and fate of the vacuoles are discussed. (Author)
AD-658 296 Not available from CFSTI.

A STUDY TO ASSESS THE IMPACT OF TOXIC PROPELLANTS ON KSC ECOLOGY FINAL REPORT,
TRW Systems, Cape Canaveral, Fla.
Dec 66, 92p NASA-CR-87803
Contract NAS10-3147
Prepared in Cooperation With Boyce Thompson Inst. for Plant Res., Inc., Yonkers, N. Y.

Descriptors: *Ecology, *Hydrogen fluoride, *Nitrogen oxide, *Propellant, *Toxicity, Concentration, Damage, Effect, Exposure, Fluoride, Hydrogen, Launch, Nitrogen, Operation, Oxide, Plant (biol), Tetroxide, Vapor.

For abstract, see STAR 05 20.
N67-35193 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF ISOQUINALALDEHYDE THIOSEMICARBAZONE (NSC-92188).
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-175 692 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF NOGALAMYCIN (NSC-70845).
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-175 693 HC$3.00 MF$0.65

REPEATED INTRAVENOUS ADMINISTRATION - WEANLING PIGS,
Hazleton Labs., Inc., Falls Church, Va.
For primary bibliographic entry see Field 6O.
PB-175 794 HC$3.00 MF$0.65

SINGLE-DOSE TOXICITY IN MICE OF MICROIZED AND NON-MICRONIZED SAMPLES OF ISOQUINALALDEHYDE THIOSEMICARBAZONE (NSC-92199) AND ATTEMPTS TO DEVELOP AN INTRAVENOUS DOSAGE FORM.
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-175 795 HC$3.00 MF$0.65

STUDIES ON THE TOXICITY OF NICOTINAMIDE FOLLOWING DAILY ORAL ADMINISTRATION TO BEAGLE DOGS.
South Shore Analytical and Research Lab., Inc., Islip, N. Y.
For primary bibliographic entry see Field 6O.
PB-175 796 HC$3.00 MF$0.65

EFFECTS UPON CHOLERESIS IN BEAGLES: DECREASE INDUCED WITH SARAMYCETIN (NSC-100844) AND INCREASE INDUCED WITH TAUROCHOLIC ACID Na.
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-175 797 HC$3.00 MF$0.65

7. CHEMISTRY

7A. Chemical Engineering

OPTIMIZATION OF A REVERSE OSMOSIS SEA WATER DESALINATION SYSTEM.
Final rept. Jul-Oct 66,
Universal Water Corp Del Mar Calif
Serop Manjikian, Clement H. Allen, James A. Kavanagh, and Clifford K. Monzeglio. 27 Oct 66, 80p
NCEL-CR-67.027
Contract NBy-62214

Descriptors: (*Sea water, Desalination), (*Desalination, Optimization), (*Membranes, Desalination), Cellulose acetates, Semipermeability, Additives, Formamides, Pyridines, Osmosis, Material forming, Structural properties.
Identifiers: Reverse osmosis.

Work was directed toward improvement of semipermeable membranes for use in reverse osmosis desalination systems. Inclusion of pyridine as a constituent in the membrane casting solution has resulted in appreciable increased membrane strength. Design criteria for various systems for desalting sea water, based on present technology, were evaluated. It is proposed to use a two pass system with sea water initially passed through membranes at 1200 psi to produce an intermediate water of about 5,000 ppm. This intermediate water is stored as produced and, in a predetermined time cycle, is used as feed for the same membrane units on a time shared basis, to produce product water of less than 500 ppm TDS. (Author)
AD-657 855 HC$3.00 MF$0.65

LIMITING RELATION FOR THE EDDY DIFFUSIVITY CLOSE TO A WALL.
Revised ed.,
Illinois Univ Urbana
Jaime S. Son, and Thomas J. Hanratty. 4 Nov 66, 10p
AFOSR-67-2135
Grant AF-AFOSR-547-67
Revision of manuscript submitted 25 Jul 66.
Availability: Published in American Institute of Chemical Engineers Journal v13 n4 p689-96 Jul 1967.

Descriptors: (*Mass transfer, Diffusivity), (*Pipes, *Turbulent boundary layer), Fluid flow, Viscosity, Velocity, Turbulence, Reynolds number.

Experiments on mass transfer for fully developed flow in a pipe show that the eddy diffusivity for mass close to the wall is described by the functionality: epsilon/nu = G (y (+)). The best interpretation of presently available data in a pipe and in an annulus is given by the following, more explicit relation epsilon/nu = 0.00032 (y (+) to the 4th power). The evidence for this latter relation is not as conclusive as one would like. Accurate measurements of concentration profiles close to a wall are needed. (Author)
AD-658 281 Not available from CFSTI.

THE PREPARATION OF 17 O ENRICHED WATER FROM ENRICHED NITRIC OXIDE GAS,
Los Alamos Scientific Lab., N. Mex.
Daniel Pavone, and Mohammed Alei, Jr. 5 Apr 67, 6p
Contract W-7405-eng-36

Descriptors: (*Nuclear magnetic resonance, Physical chemistry), (*Radioactive isotopes, Oxygen), Water, Distillation, Nitrogen, Recovery, Gases, Water vapor.

For abstract, see NSA 21 18.
LA-3698 HC$3.00 MF$0.65

DETERMINATION OF OXYGEN IN FLUORIDES AND REFRACTORIES BY INERT GAS FUSION.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
B. F. Greenfield, and K. R. Hyde. Mar 67, 10p
AERE-R-4850

Descriptors: *Analytical chemistry, *Fluoride, *Fusion, *Metal halide, *Oxygen, *Refractory material, Analysis, Argon, Carbon dioxide, Carbon monoxide, Chemistry, Compound, Gas, Halide, Inert, Material, Metal, Nitride, Refractory.

For abstract, see STAR 05 20.
N67-34341 HC$3.00 MF$0.65

ATOM RECOMBINATION. PART I - HALOGON ATOMS. PART II - SINGLET MOLECULAR OXYGEN FINAL SCIENTIFIC REPORT, JAN. 1963 - APR. 1967.
British Columbia Univ., Vancouver. Dept. of Chemistry.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 20.
N67-34572 HC$3.00 MF$0.65

LABORATORY DEVELOPMENT OF A PROCESS FOR INCORPORATION OF RADIOACTIVE WASTE SOLUTIONS AND SLURRIES IN EMULSIFIED ASPHALT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
ORNL-4003 HC$3.00 MF$0.65

POSSIBLE HEAD-END PROCESSES FOR HEAVY-WATER-MODERATED ORGANIC-COOLED REACTOR (HWOCR) FUELS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
ORNL-4109 HC$3.00 MF$0.65

7B. Inorganic Chemistry

RESEARCH ON CHEMISTRY OF O3F2 AND O2F2.
Technical summary rept. 1 Jan-30 Jun 64,
IIT Research Inst., Chicago, Ill. Technology Center.
Irvine J. Solomon. 1 Sep 64, 27p IITRI-C227-7/8
Contract AF 49 (638)-1175
See also AD-450 716.

Descriptors: (*Oxidizers, Chemical properties), (*Oxygen compounds, Chemical reactions), (*Fluorides, Chemical reactions), Fluoroamines, Oxyfluorides, Metalorganic compounds, Ions, Spectra (Infrared), Nitric acid, Fluorination.
Identifiers: Oxygen fluorides.

A report is given of progress in a study aimed at the elucidation of the chemistry of O3F2 and O2F2 with inorganic compounds, and at the determination of the physical properties of O4F2 as a means of revealing the presence or absence of ionic species in O4F2.
AD-449 383 HC$3.00

STUDIES ON THE CHEMISTRY OF HALOGENS AND OF POLYHALIDES. XXVI. INFRARED ABSORPTION SPECTRA OF IODINE BROMIDE AND ITS COMPLEXES,
Michigan State Univ East Lansing Dept of Chemistry
Yoshiharu Yagi, Alexander I. Popov, and Willis B. Person. 17 Oct 66, 9p
AROD-4424:3
Contract DA-31-124-ARO (D)-159
Prepared in cooperation with Florida Univ., Gainesville, Dept. of Chemistry. See also AD-623 708.
Availability: Published in Journal of Physical Chemistry v71 n8 p2439-44 Jul 1967.

Descriptors: (*Complex compounds, *Halides), (*Iodine compounds, Spectra (Infrared)), (*Bromides, Spectra (Infrared)), Band spectrum, Intensity, Pyridines, Solvents, Chemical bonds, Halogens.
Identifiers: Iodine monobromide.

The influence of complexation on the frequency of the 1-Br fundamental stretching vibration in iodine bromide complexes has been investigated. The frequency and the intensity of this band are strongly influenced by the strength of the iodine bromide-electron donor interaction. The position of the IBr band varies from 261/cm in carbon tetrachloride solutions to 205/cm for the pyridine-IBr complex dissolved in benzene. In solid complexes the IBr band is split into a doublet. The changes in frequency are analyzed to obtain changes in force constants. Some attempt is made to interpret these results. (Author)
AD-657 541 Not available from CFSTI.

A THERMOANALYTICAL STUDY OF SEVERAL COBALT (II) CHLORIDE-AMINE ONIUM CHLORIDE SYSTEMS.
Revised ed.,
Houston Univ Tex Dept of Chemistry
J. R. Williams, and W. W. Wendlandt. 11 Jan 67, 14p
AFOSR-67-2020
Grant AF-AFOSR-1190-67
Revision of manuscript received 31 Oct 66.
Availability: Published in Journal of Inorganic Chemistry v29 p1399-1409 1967.

Descriptors: (*Cobalt compounds, Complex compounds), (*Ammonium compounds, Complex compounds), (*Complex compounds, Thermochemistry), Chlorides, Amines, High-temperature research, Thermogravimetric analysis, Calorimetry, Spectroscopy, Differential thermal analysis, Magnetic properties, Molecular structure, Thermal stability, Phase diagrams.
Identifiers: Ammonium chlorides, Cobaltous chloride.

The high temperature reactions between cobalt (II) chloride and R-ammonium chlorides, where R is the alkyl group attached to the nitrogen atom, were investigated by the techniques of thermogravimetric analysis, differential scanning calorimetry, reflectance spectroscopy, differential thermal analysis, and magnetic susceptibility. The reactions all followed the same path as given by the equation: 2 (R-ammonium chloride) (s) + CoCl2 (s) yields (R-ammonium)2CoCl4 (s). For each of the complexes studied, the configuration, thermal stability range, reaction temperature, and thermal phase diagram were determined. (Author)
AD-657 645 Not available from CFSTI.

REACTIONS OF DIFLUORAMINE WITH LEWIS ACIDS,
IIT Research Inst Chicago Ill
J. N. Keith, R. J. Douthart, W. K. Sumida, and I. J. Solomon. 23 Apr 65, 10p
AFOSR-67-1991
Contract AF 49 (638)-1175, ARPA Order-350-62
Availability: Published in Advances in Chemistry Series n54 p141-7 1966.

Descriptors: (*Fluoroamines, Chemical reactions), (*Oxidizers, Fluoroamines), Acid-base equilibrium, Ammonium compounds, Hydrochloric acid, Halogenated hydrocarbons, Acetic acids, Complex compounds, Sulfur compounds, Oxides, Nuclear magnetic resonance, Metalorganic compounds.
Identifiers: Aluminum trimethides, Fluorimide, Gallium trimethide, Sulfur trioxide.

The acid-base chemistry of difluoramine, HNF2, and its methyl derivative is being studied to establish the existence of difluorammonium compounds and to obtain new oxidizers containing difluoramino groups. The protic acids, hydrogen chloride and trifluoroacetic acid, do not form compounds with difluoramine in the condensed state methyldifluoramine, however, may form a weak complex with hydrogen chloride. Trimethylaluminum, a strong Lewis acid, reacts with difluoramine liberating methane. The postulated intermediate, has not yet been isolated. Although trimethylgallium and difluoramine do not form a compound at low temperatures, methane is slowly evolved. Both difluoramine and methyldifluoramine form 1:1 adducts with sulfur trioxide. NMR analysis of the difluoramine adduct indicates that the proton and fluorine atoms are no longer adjacent, possibly indicating that it is difluoramidosulfamic acid. (Author)
AD-657 650 Not available from CFSTI.

CHLORINE (III) OXIDE, A NEW CHLORINE OXIDE,
Atlantic Research Corp Alexandria Va Kinetics and Combustion Group
Edward T. McHale, and Guenther von Elbe. 8 Aug 66, 5p
AFOSR-67-1974
Contract AF 49 (638)-1645
Availability: Published in Journal of the American Chemical Society v89 p2795-7 1967.

Descriptors: (*Chlorine compounds, *Oxides), Synthesis (Chemistry), Physical properties, Chemical properties, Molecular structure.
Identifiers: Chlorine sesquioxide.

A chlorine oxide with the empirical formula ClO1.5 was isolated during a study of the decomposition of ClO2. This species is believed to be the new compound chlorine (III) oxide, Cl2O3. Its synthesis and properties are described.
AD-657 729 Not available from CFSTI.

THE mu-OXO-DIFLUOROPHOSPHINES (CF3)2C (OPF2)I, (CF3)2C (OPF2)Br, AND (CF3)2C (OPF2)H,
Rohm and Haas Co Huntsville Ala Redstone Research Labs
Max Lustig, and W. E. Hill. 27 Feb 67, 4p
Contract DA-01-021-AMC-11536 (Z)
Availability: Published in Inorganic Chemistry v6 p1448-50 1967.

Descriptors: (*Fluorine compounds, Synthesis (Chemistry)), (*Phosphines, Synthesis (Chemistry)), Hydrogen compounds, Bromine compounds, Iodine compounds, Halogenated hydrocarbons, Oxygen compounds, Physical properties, Chemical properties, Spectra (Infrared), Mass spectrum, Nuclear magnetic resonance.
Identifiers: Bromo (oxo difluorophosphine)hexafluoropropane, Hydrido (oxo difluorophosphine)-hexafluoropropane, Iodo (oxo difluorophosphine)-hexafluoropropanes, Oxo difluorophosphines.

The reactions between hexafluoroacetone and difluoroiodophosphine, PF2I, and difluorobromophosphine, PF2B4, yield the addition compounds 2 - iodo - 2- (mu - oxo - difluorophosphine)hexafluoropropane, (CF3)2C (OPF2)I, and 2-bromo-2- (mu-oxo-difluorophosphine)hexafluoropropane, (CF3)2C (OPF2)Br, respectively. The former addition compound reacts with mercury in the presence of hydrogen iodide to give 2-hydrido - 2- (Mu - oxo - difluorophosphine)hexafluoropropane, (CF3)2C (OPF2)H. Some physical and chemical properties of these three new compounds were examined. (Author)
AD-657 866 Not available from CFSTI.

QUANTITATIVE DETERMINATION OF ADMIXTURES IN MOLYBDENUM. SPECTRAL AND ANALYTICAL DETERMINATION OF ADMIXTURES IN TUNGSTEN PREPARATES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11F.
AD-657 958 HC$3.00 MF$0.65

DETERMINATION OF CALCIUM CARBONATE IN MIXED PAINT PIGMENTS BY A NEW, SPECIFIC, TITRIMETRIC TECHNIQUE.
Army Coating and Chemical Lab Aberdeen Proving Ground Md
For primary bibliographic entry see Field 11C.
AD-658 075 HC$3.00 MF$0.65

CHROMATOGRAPHY AND SOLVENT EXTRACTION OF ORGANO-METALLIC COMPLEXES.
Imperial Coll of Science and Technology London (England)
For primary bibliographic entry see Field 7D.
AD-658 186 HC$3.00 MF$0.65

HYDRIDO-COMPLEXES OF RHODIUM (I) AND COBALT (I).

Technical note.
Milan Univ (Italy) Istituto Di Chimica Generale A. Sacco, and R. Ugo. 25 Jul 63, 14p Rept no. TN-1
Grant AF-EOAR-62-34

Descriptors: (*Rhodium compounds, Complex compounds), (*Cobalt compounds, Complex compounds), (*Complex compounds, Synthesis (Chemistry)), Hydrides, Chlorides, Perchlorates, Organoboranes, Valence, Magnetic properties, Phosphines, Spectra (Infrared), Dipole moments, Italy.

The preparation and properties of complex salts of rhodium (I), of formula (Rh (C2H4 (PPh2)2)2) X (X = Cl, ClO4, BPh4), are described. From these a very stable hydrido-complex of rhodium (I), of formula (RhH (C2H4 (PPh2)2)2) is prepared by reduction with lithium aluminium hydride and with sodium borohydride. The product of reaction between CoBr2 (C2H4 (PPh2)2)2 and sodium borohydride, previously described as a derivative of cobalt (O), is shown to be a hydrido-complex of cobalt (I), of formula (CoH (C2H4 (PPh2)2)2). This formula is proved by the diamagnetism of the compound, by its infrared spectrum and by its reaction with carbon tetrachloride to give chloroform. The dipole moments, of the order of 3 - 4 D, suggest a non-ortogonal structure for these hydrido-complexes of rhodium and cobalt. (Author)
AD-658 191 HC$3.00 MF$0.65

RESEARCH ON LINEAR BORON-NITROGEN POLYMERS.
Technical summary rept. no. 1, 1 Sep 60-31 Aug 62 (Final),
Manchester Coll of Science and Technology (England)
Michael F. Lappert, R. H. Cragg, and B. P. Tilley. 26 Oct 62, 31p
Contract AF 61 (052)-419

Descriptors: (*Inorganic polymers, Synthesis (Chemistry)), (*Boranes, Inorganic polymers), (*Nitrogen compounds, Inorganic polymers), Amides, Sulfur compounds, Amines, Ureides, Chemical equilibrium, Oxygen compounds, Heterocyclic compounds, Great Britain.
Identifiers: Amidoboranes, Amino boranes, Boroureas, Carbamatoboranes, Sulfamidoboranes, Sulfonamidoboranes.

Several novel organic-substituted B-N and B-O compounds were prepared, characterised, examined spectroscopically, and studied chemically. The new classes of compounds are the sulphamidoboranes, =B.NH.SO2.NH.B=, sulphonamidoboranes, =B.NH.SO2, amidoboranes, =B.NR'.CO.R", carbamatoboranes, =B.CO2.NR'R", and cyclic boroureas, -B< (NR'.CO2) >NR". Aminoboranes of types o-C6H4O2 >B.NR'R" and o-C6H4 (NH)2>B.NR'R" were studied, primarily from the standpoint of the equilibrium: 2 monomer = dimer (hydrolytically-stable), and its dependence on R' and R". Boron-oxygen compounds investigated include (RO)2B-O-B (OR)2, (ROBO)4 (not yet confirmed), (R'R"NBO)3, and isocyanate-boroxine polymers. (Author)
AD-658 193 HC$3.00 MF$0.65

PHOSPHORUS-NITROGEN COMPOUNDS,
Heidelberg Univ (West Germany) Dept of Inorganic Chemistry (1st)
Margot Becke-Goehring. 1967, 12p Rept no. Scientific-1
Contract AF 61 (052)-682

Descriptors: (*Phosphorus compounds, Synthesis (Chemistry)), (*Nitrides, Synthesis (Chemistry)), Amides, Sulfur compounds, Chlorides, Nuclear magnetic resonance, West Germany.
Identifiers: Phosphorus nitrides.

The phosphorus nitride salts ((C6H5)2P (Cl)=N-PCl3)PCl6 and ((C6H5)2P (Cl)=N-PCl3)Cl can be prepared by reacting thiophosphinic acid amide with PCl5. The salts react with SO2 to form (C6H5)2P (Cl)=N-P (O)Cl2. (Author)
AD-658 195 HC$3.00 MF$0.65

PREPARATION OF THE INTERMETALLIC COMPOUND YCo5 BY THE AMALGAM PROCESS,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
For primary bibliographic entry see Field 11F.
AD-658 218 HC$3.00 MF$0.65

A PHOTOLYTIC PREPARATION OF METAL-METAL BONDS BETWEEN SOME GROUP VI AND GROUP IV METALS,
Rohm and Haas Co Huntsville Ala Gorgas Lab
John K. Ruff. 24 Feb 67, 3p
Contract DA-01-021-AMC-11536 (Z)
Availability: Published in Inorganic Chemistry v6 p1502-4 1967.

Descriptors: (*Complex compounds, Synthesis (Chemistry)), (*Metal carbonyls, Complex compounds), Chromium compounds, Molybdenum compounds, Tungsten compounds, Tin compounds, Germanium compounds, Iron compounds, Arsenic compounds, Photolysis, Chlorides, Chemical bonds, Spectra (Infrared).

The photolytic reaction of Cr (CO)6, Mo (CO)6, and W (CO)6 with either (C6H5)4AsSnCl3 or (C6H5)4AsGeCl3 produced complexes of the type (C6H5)4AsM (CO)5M'Cl3 where M = Cr, Mo, or W and M' = Sn or Ge. Similar derivatives of Fe (CO)5 were also prepared. (Author)
AD-658 237 Not available from CFSTI.

CHARGE-TRANSFER INTERACTIONS OF THE HIGHER VALENCY HALIDES AND OXYHALIDES WITH AROMATIC HYDROCARBONS. BALL-PLANE INTERACTIONS. MEASUREMENTS OF WEAK INTERACTIONS AND LITERATURE REVIEW,
Naval Ordnance Test Station China Lake Calif
For primary bibliographic entry see Field 7D.
AD-658 333 HC$3.00 MF$0.65

COMMENTS ON THE INFLUENCE OF INTERMEDIATE EXCITONS AND EXCHANGE FORCES ON THE INTERACTION IN MOLECULAR CRYSTALS: THE CRYSTAL STRUCTURE OF CHLORINE,
Chicago Univ Ill Inst for the Study of Metals
For primary bibliographic entry see Field 20B.
AD-658 352 Not available from CFSTI.

ANALYTICAL COORDINATION CHEMISTRY: TITRIMETRY, GRAVIMETRY, FLAME PHOTOMETRY, SPECTROMETRY, GAS EVOLUTION AND ISOTOPIC PREPARATIONS, JULY 1965 TO JUNE 1966.
Technical note,
National Bureau of Standards, Washington, D. C.
Oscar Menis. 1966, 94p
Series formerly titled QUANTITATIVE SEPARATIONS. See also C13.46-275.

Descriptors: (*Chemical analysis, Reviews), (*Complex compounds, Chemical analysis), (*Volumetric analysis, Reviews), (*Gravimetric analysis, Reviews), (*Spectroscopy, Reviews), (*Radioactive isotopes, Standards), Refractory metals, Separation, Differential thermal analysis, Microanalysis, Gas analysis, Molybdenum, Tungsten, Magnesium, Copper, Zinc, Antimony, Nickel, Zirconium, Calcium, Uranium, Plutonium.

Contents Include: Titrimetry (spectrophotometric titrations, controlled potential coulometric titration - molybdenum, pyrohydrolytic separations); Gravimetry (analysis of standard reference materials, studies and application of homogeneous precipitations, separation of tungsten and molybdenum, differential thermal analysis); Flame spectrophotometry and atomic absorption (instrumentation, determination of magnesium in various materials by atomic absorption, determination of magnesium by flame emission, determination of copper in SRM steel samples, determination of trace elements at the submicrogram level in high purity zinc); Spectrophotometry (spectrophotometric determination of antimony, a highly precise nickel method in the presence of copper and cobalt, zirconium in maraging steel, determination of calcium as the glyoxal-bis- (2-hydroxyanil) complex, analysis of high-purity zinc, modified curcumin procedure for boron); Gases in metals; Uranium and plutonium isottopic standsrds; Service sample analyses.
NBS-TN-402 HC$0.50 MF$0.65

FORMATION AND STRUCTURE OF IONOGENIC AND NON-IONOGENIC CARBON MONOXIDE COMPLEXES OF PLATINUM METALS.
Bildung Und Struktur Ionogener Und Nichtionogener Kohlenoxidkomplexe Von Platinmetallen
Technische Hochschule Munchen (West Germany).
V. Frey. 1966, 65p
in German

Descriptors: *Carbon compound, *Chemical reaction, *Molecular structure, *Noble metal, Anion, Carbon, Chemical, Complex, Compound, Halogen, Ionic, Iridium, Iron, Metal, Molecular, Noble, Osmium, Preparation, Reaction, Rhodium, Ruthenium, Spectrum, Structure.

For abstract, see STAR 05 20.
N67-34118 HC$3.00 MF$0.65

THE PREPARATION OF THE NITRIDES OF CHROMIUM.
Aeronautical Research Labs., Melbourne (Australia).
T. G. Hill, and T. Mills. Sep 66, 10p ARL/MET-44

Descriptors: *Chemical reaction, *Chromium, *Nitride, Chamber, Chemical, Getter, Nitrogen, Oxygen, Powder, Preparation, Reaction, Sample, Sintering, Titanium.

For abstract, see STAR 05 20.
N67-34948 HC$3.00 MF$0.65

ADSORPTION OF PROTACTINIUM ON UNFIRED VYCOR FINAL HOT-CELL EXPERIMENTS,
Oak Ridge National Lab., Tenn.
J. H. Goode, and J. G. Moore. Jun 67, 35p
Contract W-7405-eng-26

Descriptors: (*Protactinium, Adsorption), Decontamination, Recovery, Uranium compounds, Radioactive isotopes, Radioactive decay, Separation, Thorium compounds, Mixtures.

For abstract, see NSA 21 17.
ORNL-3950 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

7C. Organic Chemistry

AN EXPERIMENTAL CHEMICAL INFORMATION AND DATA SYSTEM.

Pennsylvania Univ Philadelphia
For primary bibliographic entry see Field 5B.
AD-657 575 HC$3.00 MF$0.65

CHROMATOGRAPHIC SEPARATION OF THE 1-ALKOXY-2 (3)-HYDROXY-3 (2)-AMINOCYCLOHEXANES AND THEIR DERIVATIVES,
Defence Chemical Biological and Radiation Labs Ottawa (Ontario)
A. A. Casselman, and R. A. B. Bannard. 4 Nov 66, 5p Rept no. DCBRL-519
Availability: Published in Journal of Chromatography v28 p462-5 1967.

Descriptors: (*Molecular isomerism, *Chromatographic analysis), (*Amines, *Stereochemistry), Ethers, Cyclohexanols, O-heterocyclic compounds, Cyclohexanes, Thin layer chromatography, Gas chromatography, Canada.
Identifiers: Amino cyclohexanols.

In an effort to develop methods for the separation and quantitative estimation of the proportions of the positionally isomeric amines which could result from the action of ammonia on each oxide of the stereoisomeric 1-alkoxy-2,3-epoxy-cyclohexanes, the paper, thin-layer, and vapor phase chromatographic separation of the stereoisomeric 1-alkoxy-2-hydroxy-3-aminocyclohexanes (as well as their N-acetyl, O,N-diacetyl, and O,N,N-triacetyl derivatives) were studied. All groups of the isomers were found to be separable by one or another of the chromatographic methods.
AD-657 641 Not available from CFSTI.

MECHANISMS OF REACTIONS OF THIOLSULFINATES (SULFENIC ANHYDRIDES). I. THE THIOLSULFINATE-SULFINIC ACID REACTION,
Oregon State Univ Corvallis Dept of Chemistry
John L. Kice, Clifford G. Venier, and Leslie Heasley. 7 Jan 67, 10p
AFOSR-67-2010
Grant AF-AFOSR-106-65
Availability: Published in Journal of the American Chemical Society v89 n14 p3557-65 Jul 5 1967.

Descriptors: (*Organic sulfur compounds, Chemical reactions), (*Sulfinic acids, Chemical reactions), Sulfides, Catalysis, Toluenes, Thiols, Reaction kinetics, Benzenes.
Identifiers: Phenyl benzene thiosulfinates, Toluene thiosulfinates, Thiosulfinates.

In aqueous acetic acid containing some sulfuric acid, aryl thiolsulfinates (sulfenic anhydrides) react with aromatic sulfinic acids considerably more rapidly than they undergo disproportionation to thiolsulfonate and disulfide. The mechanism of this previously unreported thiolsulfinate-sulfinic acid reaction was investigated. Of particular interest is the fact that the reaction is subject to rather dramatic catalysis by added alkyl or aryl sulfides. Study of the dependence of the rate of the sulfide-catalyzed reaction on various reaction variables shows that the mechanism involves a rate-determining nucleophilic attack by the sulfide on the protonated thiolsulfinate. The catalyzed reaction is thus similar to several other recently studied S-S bond scissions in requiring both nucleophilic and electrophilic assistance. The nonsulfide-catalyzed thiolsulfinate-sulfinic acid reaction exhibits a different dependence on the acidity of the medium and a different solvent isotope effect than the sulfide-catalyzed process. This, coupled with the variation of rate with sulfinic acid structure, suggest that its mechanism involves a general base catalyzed attack of the sulfinic acid on the protonated thiolsulfinate. (Author)
AD-657 659 Not available from CFSTI.

POLYMERIZATION STUDIES LEADING TO HIGH STRENGTH CHEMICAL RESISTANT ELASTOMERS SERVICEABLE AT TEMPERATURE EXTREMES.
Uniroyal Inc Wayne N J Research Center
For primary bibliographic entry see Field 11J.
AD-657 675 HC$3.00 MF$0.65

REACTION OF OXYGEN ATOMS WITH ETHANOL,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-657 699 Not available from CFSTI.

THE REACTION OF ORGANOBORANES WITH DIMETHYLSULPHONIUM METHYLIDE,
State Univ of New York Buffalo Dept of Chemistry
Joseph J. Tufariello, Paul Wojtkowski, and Lester J. C. Lee. 29 Mar 67, 6p
AROD-6980:1
Grant DA-ARO (D)-31-124-G889
Availability: Published in Chemical Communications p505 1967.

Descriptors: (*Organoboranes, Chemical reactions), (*Organic sulfur compounds, Chemical reactions), (*Alcohols, Synthesis (Chemistry)), Oxidation, Chemical bonds.

It was found that the reaction of an organoborane, e.g. tri-n-hexylborane, with dimethylsulfonium methylide gives a high yield of the corresponding homologated alcohol after alkaline hydrogen peroxide oxidation of the product organoborane.
AD-657 712 Not available from CFSTI.

POLYFLUORINATED AROMATIC ESTERS PREPARATION AND CARBONYL STRETCHING FREQUENCIES,
IIT Research Inst Chicago Ill Technology Center
Robert Filler, James F. White, Andrew J. Kacmarek, and Irvine J. Solomon. 17 Mar 66, 7p
AFOSR-67-1987
Contract AF 49 (638)-1175
Prepared in cooperation with Illinois Inst. of Tech., Chicago.
Availability: Published in Candian Journal of Chemistry v44 p2346-8 1966.

Descriptors: (*Halogenated hydrocarbons, *Infrared spectroscopy), (*Benzoates, Halogenated hydrocarbons), Aromatic compounds, Esters, Fluorine compounds, Organic oxygen compounds, Synthesis (Chemistry).
Identifiers: Pentafluorophenyl benzoates.

A report is given of the preparation of a series of phenyl benzoates which have a pentafluorophenyl group located in the acid and/or phenolic portions of the ester. The infrared spectra were examined with reference to the influence of the C6F5 group on the carbonyl frequency. The resultant data are explained in terms of both inductive and mesomeric effects. Comparitive data were also obtained for several other esters containing the C6H5 group.
AD-657 720 Not available from CFSTI.

THE SYNTHESIS AND PROPERTIES OF SOME DITHIOSEMICARBAZONES,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-657 741 Not available from CFSTI.

THE CATALYTIC ADDITION OF FLUORINE TO A CARBONYL GROUP. PREPARATION OF FLUOROXY COMPOUNDS,
Rohm and Haas Co Huntsville Ala Redstone Research Labs
Max Lustig, A. R. Pitochelli, and John K. Ruff. 21 Nov 66, 4p
Contract DA-01-021-AMC-11536 (Z)
Availability: Published in Journal of the American Chemical Society v89 p2841-3 1967.

Descriptors: (*Oxyfluorides, Synthesis (Chemistry)), (*Fluorination, Catalysis), (*Organic oxygen compounds, Fluorination), Fluorine, Addition reactions, Halogenated hydrocarbons, Alkanes, Butane, Propanes, Amines, Spectra (Infrared), Nuclear magnetic resonance, Chemical properties.
Identifiers: Fluoroxy alkanes, Decafluoro bis (fluoroxy)pentanes, Fluoroxy difluoroamino hexafluoropropanes, Fluoroxy tetrafluoroethanes, Fluoroxy difluoroamino tetrafluoroethanes, Octafluoro bis (fluoroxy)butanes.

The low-temperature metal fluoride catalytic fluorination of carbonyl halides and fluoroalkyl acid fluorides provides a simple method for the preparation of fluoroxyfluoroalkanes in high yields. In addition to some known fluoroxy derivatives the new compounds, 1-fluoroxy-1, 1,2,2-tetrafluoroethane, FOCF2CF2H, octafluoro-1,4-bis (fluoroxy)butane, FO (CF2)4OF, decafluoro-1,5-bis (fluoroxy)pentane, FO (CF2)5OF, 1-fluoroxy-2-difluoraminotetrafluoroethane, CF2 (NF2)CF2OF, and 1 - fluoroxy - 2 - difluoraminohexafluoropropane, CF3CF (NF2)CF2OF, are also prepared by this method. Some chemical and physical properties of the new compounds are given.
AD-657 867 Not available from CFSTI.

HYDROGEN-ABSTRACTION REACTIONS BY ETHYL RADICALS FROM METHYLAMINES AND HYDRAZINE,
University Coll of Wales Aberystwyth Edward Davies Chemical Lab
For primary bibliographic entry see Field 7D.
AD-657 901 Not available from CFSTI.

INFRARED STUDIES OF DIMETHYLSILYAMINE AND METHYLDISILYAMINE BY THE MATRIX-ISOLATION TECHNIQUE,
State Univ of New York Stony Brook Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-657 902 Not available from CFSTI.

STUDIES AND EXPERIMENTAL INVESTIGATIONS IN CONNECTION WITH CHEMICAL BONDING IN RESIN-TREATED CELLULOSE.
Textile Research Inst Princeton N J
For primary bibliographic entry see Field 11E.
AD-658 173 HC$3.00 MF$0.65

CHROMATOGRAPHY AND SOLVENT EXTRACTION OF ORGANO-METALLIC COMPLEXES.
Imperial Coll of Science and Technology London (England)
For primary bibliographic entry see Field 7D.
AD-658 186 HC$3.00 MF$0.65

NONPLANAR CYCLOBUTANE. II. THE METHYL 3-ISOPROPYLCYCLOBUTANE CARBOXYLATE SYSTEM.
Revised ed.,
Miami Univ Fla Dept of Pediatrics
I. Lillien, and R. A. Doughty. 20 Dec 66, 9p
AFOSR-67-2098
Grant AF-AFOSR-123-63
Revision of manuscript submitted 27 Aug 66. See also AD-648 178.
Availability: Published in Tetrahedron v23 p3321-6 1967.

Descriptors: (*Cyclobutanes, *Stereochemistry), Esters, Nuclear magnetic resonance, Chemical equilibrium, Molecular isomerism, Carboxylic acids.
Identifiers: Methyl isopropyl cyclopropane carboxylates, Molecular conformations.

NMR spectra and basic equilibration of cis and trans methyl 3-isopropylcyclobutane carboxylate are reported. Treatment of the nonplanar cyclobutane system by analogy with cyclohexane is potentially possible, but limited by (1) greater dependence of ring puckering on substituents; and (2) intervention of planar conformers. (Author)
AD-658 261 Not available from CFSTI.

CONFORMATIONAL ENERGY AND CONFIGURATIONAL STATISTICS OF POLY-L-PROLINE,
Stanford Univ Calif Dept of Chemistry
Paul R. Schimmel, and Paul J. Flory. 8 May 67, 11p
AFOSR-67-2099
Contract AF 49 (638)-1341
Availability: Published in Proceedings of the National Academy of Sciences v58 n1 p52-9 Jul 1967.

Descriptors: (*Peptides, *Stereochemistry), N-heterocyclic compounds, Polymers, Potential energy, Molecular isomerism, Statistical distributions.
Identifiers: Molecular conformations, Polyprolines.

The configuration of the poly-L-proline chain with all units trans is treated. The rotation angle phi is taken to be fixed by the rigid geometry of the proline ring; hence, the conformational energy of a residue depends on psi alone. This energy, calculated from the interactions between the non-bonded atoms which are proximate in various conformations, prescribes an unusually stiff random coil which over short sequences has the same dimensions as a helix. The mean square end-to-end distance of the chain calculated from the conformational potential is comparable to that of the Cowan-McGavin helix for sequences up to ca. 50 residues. Departures from the dimensions of the helix increase as the chain is lengthened, and for very long chains the configuration may be represented as that of a random coil having an unusually low tortuosity. The average dimensions of the random coil are very sensitive, however, to the precise form of the conformational potential. This sensitivity is substantiated by the unusually large effect of the solvent medium on the hydrodynamic dimensions of high molecular weight poly-L-proline II chains. These and other results of this investigation provide for a rational understanding of available experimental results. Further studies dealing with poly-L-proline I and cooperative I = II transition are reported in brief. (Author)
AD-658 263 Not available from CFSTI.

SYNTHESIS OF TROPINE-LABELED ATROPINE I. MICRO METHODS FOR THE SYNTHESIS OF TROPINE AND FOR ITS ESTERIFICATION WITH TROPIC ACID.
Pittsburgh Univ Pa School of Medicine
For primary bibliographic entry see Field 6O.
AD-658 270 Not available from CFSTI.

THE BASE-CATALYZED DECOMPOSITION OF PEROXYPIVALIC ACID IN AQUEOUS SOLUTION.
Technical rept.,
Naval Academy Annapolis Md Dept of Science
Edward Koubek, and J. E. Welsch. 8 Aug 66, 9p
Rept no. TR-2
Report on proj. The Aqueous Chemistry of Thermodynamically Unstable Compounds.
Availability: Published in Journal of Organic Chemistry 8p 1966.

Descriptors: (*Peroxides, Decomposition), Carboxylic acids, Catalysis, Stereochemistry, Tracer studies, Reaction kinetics.
Identifiers: Peroxypivalic acids.

A study of the base-catalyzed decomposition of peroxypivalic acid lends support to a dual mechanism for reactions of this type: (1) nucleophilic attack by the peroxyanion upon the carbonyl center of the peroxyacid; and (2) nucleophilic attack of the peroxyanion upon the outer peroxidic oxygen of the peroxyacid.
AD-658 278 Not available from CFSTI.

CHARGE-TRANSFER INTERACTIONS OF THE HIGHER VALENCY HALIDES AND OXYHALIDES WITH AROMATIC HYDROCARBONS. BALL-PLANE INTERACTIONS. MEASUREMENTS OF WEAK INTERACTIONS AND LITERATURE REVIEW,
Naval Ordnance Test Station China Lake Calif
For primary bibliographic entry see Field 7D.
AD-658 333 HC$3.00 MF$0.65

EFFECT OF WATER AND SOME OTHER HYDROGEN BOND DONORS AND ACCEPTORS ON p (a)H IN ACETONITRILE OF MIXTURES OF ACIDS AND THEIR SALTS,
Minnesota Univ Minneapolis School of Chemistry
I. M. Kolthoff, and M. K. Chantooni, Jr. 5 May 67, 7p
AFOSR-67-2166
Grant AF-AFOSR-1223-67
Availability: Published in Analytical Chemistry v39 n10 p1080-4 Aug 1967.

Descriptors: (*Acid-base equilibrium, Molecular association), (*Volumetric analysis, pH), (*Acetonitriles, Acid-base equilibrium), Solvents, Ammonium compounds, Salts, Acids, Solutions, Sulfonic acids, Carboxylic acids, Water, Methanols, Butanols, Phenols, Sulfoxides, Dissociation, Reaction kinetics.

An equation is derived which allows the calculation of the effect of water on the pHa of mixtures of a weak acid and its tetraalkylammonium salt in acetonitrile (AN) from the known dissociation constant of the acid, its homoconjugation constant, and the hydration constant (s) of the anion A- of the acid. When hydration of the anion and acid are negligible, water, up to a concentration of 1M, has no effect on the paH. From the experimental data, it is possible to calculate the hydration constants of the acids in AN. The implications of the results on the effect of water and alcohols on potentiometric titration curves of unchanged acids in AN are discussed. (Author)
AD-658 391 Not available from CFSTI.

DEVISING, REVISING AND STANDARDIZING ANALYTICAL PROCESSES FOR DETERMINING POLYPHENYLS AND SOME OF THEIR ORGANIC OR INORGANIC IMPURITIES ANNUAL REPORT, 15 FEB. 1965 - 15 FEB. 1966.
Ausarbeitung Und Nacharbeitung Sowie Standardisierung Von Analytischen Verfahren Zur Bestimmung Der Poyphenyle Und Einige Ihrer Organischen Bzw. Anorganischen Verunreinigungen
Farbenfabriken Bayer, A. G., Leverkusen (West Germany). Organisch Analytisches Laboratorium.
Jun 67, 25p EUR-3466.D
Contract EURATOM-203-65-3 ORGC
in German, English Summary

Descriptors: *Analytical chemistry, *Impurity, *Polyphenyl, Analysis, Boron, Chemistry, Chlorine, Inorganic, Iron, Organic, Oxygen, Sulfur.

For abstract, see STAR 05 20.
N67-34289 HC$3.00 MF$0.65

ASYMMETRIC SYNTHESIS IN THE REACTION OF 2- TRIFLUORMETHYL-PSEUDOOXOZOLONES-/5/ OR OXOZOLONES WITH L-AMINO ACID ESTERS.
Asymmetrische Synthese Bei Der Reaktion Von 2-trifluomethyl-pseudooxazolonen-/5/Oder Oxazolonen Mit L-aminosaeureestern
Technische Hochschule Munchen (West Germany).
F. X. La Lama. 1966, 70p
in German

Descriptors: *Amino acid, *Chemical reaction, *Nucleic acid, *Stereochemistry, Acid, Amino, Asymmetry, Chemical, Compound, Ester, Heterocyclic, Nucleic, Organic, Peptide, Reaction, Ring, Synthesis.

For abstract, see STAR 05 20.
N67-34403 HC$3.00 MF$0.65

RESEARCH ON THE DERIVATIVES OF PYROMELLITIC AND CUMYLIC ACIDS.
Recherches Sur les Derives des Acides Cumidiniques Et Pyromellithique
National Aeronautics and Space Administration, Washington, D. C.
H. De Diesbach, and G. Zurbriggen. Aug 67, 13p
NASA-TT-F-11200
Transl. Into English From Helv. Chim. Acta (Basel), V. 8, 1925 P 546-557

Descriptors: *Carboxylic acid, *Isomer, *Organic compound, *Synthesis, Acid, Analog, Atom, Benzene, Bromine, Carboxylic, Chloride, Compound, Derivative, Formula, Methyl, Organic, Phthalate, Preparation, Pyromellitimide, Research.

For abstract, see STAR 05 20.
N67-34730 HC$3.00 MF$0.65

A COMPUTER ORIENTED SCHEME FOR CODING CHEMICALS IN THE FIELD OF BIOMEDICINE.
Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
For primary bibliographic entry see Field 5B.
PB-175 808 HC$3.00 MF$0.65

7D. Physical Chemistry

CATALYTIC EFFECTS OF THERMOCOUPLE MATERIALS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 14B.
AD-284 880 HC$3.00

EXPANSION OF A PARTIALLY-IONIZED GAS THROUGH A SUPERSONIC NOZZLE.
California Univ., Berkeley. Div. of Aeronautical Sciences.
For primary bibliographic entry see Field 20I.
AD-471 389 HC$3.00 MF$0.65

THE RELATIONSHIP BETWEEN MOLECULAR STRUCTURE, MORPHOLOGY, AND THE MECHANICAL PROPERTIES OF MATERIALS.
Mellon Inst., Pittsburgh, Pa.
For primary bibliographic entry see Field 11I.
AD-487 484 HC$3.00 MF$0.65

SURFACE ENERGY.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11D.
AD-488 383 HC$3.00 MF$0.65

SURFACE MIGRATION OR DIFFUSION OF GASES OR LIQUIDS ALONG SOLID INTERFACES.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11D.
AD-488 388 HC$3.00 MF$0.65

PROTON SPIN RELAXATION AND THE ACID DISSOCIATION OF THE Cr (H2O)6 (3+) COMPLEX ION,
Oklahoma State Univ Stillwater Dept of Physics
C. F. Manley, and V. L. Pollak. 14 Nov 66, 6p
AROD-4768:2

Contract DA-31-124-ARO (D)-256
Availability: Published in The Journal of Chemical Physics v46 n6 p2106-8 Mar 15 1967.

Descriptors: (*Complex compounds, Chromium compounds), (*Chromium compounds, Nuclear spins), Ions, Dissociation, Hydrates, Relaxation time, Protons.
Identifiers: Hexaaquochromium compounds.

Experimental data are presented on proton spin relaxation in aqueous Cr (III) solutions of varying acidity, at 0C. A theoretical analysis is given on the assumption that the dominant proton-exchange mechanism for the hexaquo complex is the reaction Cr (H2O)6 (3+)+H2O=Cr (H2O)5OH (2+)+H3O (+). (Author)
AD-657 535 Not available from CFSTI.

FERROMAGNETIC RESONANCE INVESTIGATION OF NITROGEN ADSORPTION ON NICKEL,
California Univ Santa Barbara Dept of Chemistry
A. A. Andreev, and P. W. Selwood. 1 Mar 67, 6p
AROD-6799:1
Grant DA-ARO (D)-31-124-G863
Availability: Published in Journal of Catalysis v8 n1 p98-9 May 1967.

Descriptors: (*Catalysts, Surface properties), (*Nickel, Catalysis), (*Nitrogen, Adsorption), Paramagnetic resonance, Atomic orbitals, Chemisorption.
Identifiers: Surface chemistry.

Nitrogen absorption on nickel by EPR was investigated. The results do not give evidence for extensive electronic interaction between the nitrogen and the nickel surface such as would be expected for true chemisorption. (Author)
AD-657 556 Not available from CFSTI.

ANODIC BEHAVIOR OF TITANIUM AND ITS ALLOYS IN SULFURIC ACID.
Army Materials Research Agency Watertown Mass
For primary bibliographic entry see Field 11F.
AD-657 557 HC$3.00 MF$0.65

THE PRESSURE DROP ACROSS CURVED INTERFACES.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Philip F. Low. Jul 67, 14p Rept no. CRREL-SR-109

Descriptors: (*Interfaces, Pressure), (*Curved profiles, Interfaces), (*Surface properties, Thermodynamics), Surface tension, Solutions, Capillaries, Water, Mathematical analysis.

The analysis of a general mathematical equation derived for the pressure drop across a curved interface indicates a valid result as long as the thickness of the interfacial region is small compared to its radius of curvature. However, if the interfacial region is within the range of surface forces, the value of the interfacial tension to be used in the equation may not be that identified with the interface between corresponding bulk phases. Further, if surface forces influence the phases in question, then it cannot be assumed that capillary rise and other associated phenomena are due only to pressure differences across curved interfaces. Also, it cannot be assumed that the curvature of the air-solution interface is controlled entirely by the shape of the capillary. (Author)
AD-657 580 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE INFRARED ABSORPTION BY ATMOSPHERIC GASES.
Annual technical summary rept. 1 May 66-31 Jul 67,
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
Darrell E. Burch, David A. Gryvnak, David R. Johnston, and Earl E. Miller. 31 Aug 67, 5p Rept no. U-4158
Contract Nonr-3560 (00), ARPA Order-237

Descriptors: (*Atmosphere, *Infrared spectroscopy), Carbon dioxide, Water vapor, Nitrogen oxides, Methane, Absorption spectrum, Spectra (Infrared).

Brief summaries are given of the results of the following projects: shapes of the extreme wings of CO2 absorption lines; absorption by H2O between 0.8 and 1 micron; absorption by N2O and CH4; absorption by H2O in the 8-12 micron window. Also, abstracts are given of published reports and papers generated under the contract.
AD-657 614 HC$3.00 MF$0.65

ABSORPTION BY H2O BETWEEN 5045 - 14,485/cm (0.69-1.98 MICRONS).
Scientific rept.,
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
Darrell E. Burch, and David A. Gryvnak. 31 Jul 66, 124p Rept no. U-3704
Contract Nonr-3560 (00), ARPA Order-237

Descriptors: (*Water vapor, *Infrared spectroscopy), Absorption spectrum, Pressure, Band spectrum, Tables.

The absorption by water vapor in six spectral regions within 5045-14,485/cm (1.98-0.69 microns) was investigated. Samples at high pressures are presented to provide data from which line strengths and band strengths can be determined, while samples at lower pressures provide information from which line widths can be found. Transmission spectra are shown along with extensive tables of transmittance, integrated absorptance, and integrated absorption coefficient. The integrated absorption coefficients in 1/cm/gm/ (sq. cm.) were found to be as follows: 5045-5670/cm, 3.16 plus or minus 1600; 6640-7700/cm, 2.54 plus or minus 1300; 8560-9030/cm, 1.66 plus or minus 80; 9940-11,420/cm, 895 plus or minus 50; 11,795-12,765/cm, 57.2 plus or minus 2.7; and 11,385-14,485/cm, 56.1 plus or minus 2.8. (Author)
AD-657 629 HC$3.00 MF$0.65

ELECTRON-SPIN-RESONANCE STUDY OF CHLORINE ATOMS ADSORBED ON A SILICA-GEL SURFACE,
Defence Chemical Biological and Radiation Labs Ottawa (Ontario)
C. L. Gardner. 29 Jul 66, 4p Rept no. DCBRL-523
Availability: Published in The Journal of Chemical Physics v46 n8 p2991-4 Apr 15 1967.

Descriptors: (*Catalysis, Surface properties), (*Chlorine, *Electron spin resonance), (*Silica gel, Surface properties), Adsorption, Atomic orbitals, Electrostatics, Electric fields, Hyperfine structure, Interactions, Canada.
Identifiers: Surface chemistry.

An electron-spin-resonance study was made of chlorine atoms adsorbed on a silica-gel surface at 77K. The experimental results indicate that the orbital degeneracy was removed as a result of the electrostatic interaction with the surface and is believed to be the first example of detection of trapped halogen atoms. From the experimental results an estimate of 2.7 x 10 to the 17th power V/sq cm was made for the electric-field gradient at the position of the chlorine atom. (Author)
AD-657 642 Not available from CFSTI.

SPIN-SPIN INTERACTIONS IN POLYPHENYLS,
Defence Chemical Biological and Radiation Labs Ottawa (Ontario)
C. L. Gardner. 20 Dec 66, 5p Rept no. DCBRL-529
Prepared in cooperation with Amsterdam Univ. (Netherlands).
Availability: Published in Canadian Journal of Chemistry v45 p1707-10 1967.

Descriptors: (*Polycyclic compounds, *Electron spin resonance), (*Molecular energy levels, Polycyclic compounds), Band spectrum, Excitons, Wave functions, Interactions, Canada.
Identifiers: Biphenyls, Triphenyl benzenes.

An attempt was made, with some success, to interpret the zero field splitting parameters for the triplet states of molecules such as the polyphenyls where the subunits are weakly coupled and the molecules are probably nonplanar. The method used was a semi-empirical exciton theory, applied in particular to biphenyl and 1,3,5-triphenylbenzene. In these two cases it is found that structure information, in particular the angle between rings, obtained by this method is in good agreement with electron diffraction data. (Author)
AD-657 643 Not available from CFSTI.

A THERMOANALYTICAL STUDY OF SEVERAL COBALT (II) CHLORIDE-AMINE ONIUM CHLORIDE SYSTEMS.
Houston Univ Tex Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-657 645 Not available from CFSTI.

FIRST-ORDER PHASE TRANSITIONS IN SPIN-ONE ISING SYSTEMS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 20M.
AD-657 651 Not available from CFSTI.

FAR-INFRARED MEASUREMENT OF LONG-RANGE ORDER IN A DISPLACIVE PHASE TRANSITION,
Yale Univ New Haven Conn
G. P. O'Leary, and R. G. Wheeler. 24 Apr 67, 5p
AFOSR-67-1931
Grant AF-AFOSR-873-65
Availability: Published in Physical Review Letters v18 n24 p1054-6 Jun 12 1967.

Descriptors: (*Phase studies, *Infrared spectroscopy), Specific heat, Phonons, Scattering, Adsorption, Intensity, Temperature, Crystal lattices, Rotation.

Certain far-infrared phonon absorption strengths provide a method for measuring long-range order. An application to the system K2ReCl6 is described. The results indicate that the phase transition occurring at 103.4 K conforms to an Ising model. (Author)
AD-657 652 Not available from CFSTI.

DETERMINATION OF THE THERMAL ACCOMMODATION COEFFICIENTS OF GASES ON CLEAN SURFACES AT TEMPERATURES ABOVE 300K BY THE TEMPERATURE JUMP METHOD,
Missouri Univ Columbia Dept of Chemistry
For primary bibliographic entry see Field 20M.
AD-657 661 Not available from CFSTI.

HALOGEN COMBUSTION CALORIMETRY OF REFRACTORY COMPOUNDS. THE HEATS OF FORMATION OF BORON NITRIDE AND BORON FLUORIDE,
Fulmer Research Inst Ltd Stoke Poges (England)
For primary bibliographic entry see Field 11B.
AD-657 664 Not available from CFSTI.

PLANE WAVE PROPAGATION IN KINETIC THEORY,
Brown Univ Providence R I Div of Applied Mathematics
Lawrence Sirovich, and James K. Thurber. 4 Aug 66. 9p
Contract Nonr-562 (39)
Prepared in cooperation with Brookhaven National Labs., Upton, N. Y. Dept. of Applied Mathematics.
Availability: Published in Journal of Mathematical Physics v8 n4 p888-95 Apr 1967.

Descriptors: (*Kinetic theory, Propagation), Initial value problems, Boundary value problems, Series, Gases, Dynamics, Mathematical models.

A number of results for plane wave propagation in kinetic theory are obtained. Among these are the following. It is shown that the Boltzmann equation for bounded collision operator has a cutoff frequency beyond which plane waves cease to exist. The analytic continuation of the dispersion relation is discussed and asymptotic results beyond the critical frequency are obtained. Using a kinetic model it is shown that the low-frequency formal power series for complex wavenumber in terms of frequency (and vice versa) are divergent. The last is contrary to the recent result obtained for the rigid sphere Boltzmann equation. (Author)
AD-657 667 Not available from CFSTI.

RELATIVE ENTHALPY OF BERYLLIUM 1:1-ALUMINATE, BeO.Al2O3, FROM 273 TO 1173K. THERMODYNAMIC PROPERTIES FROM 273 TO 2150K,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 11B.
AD-657 677 Not available from CFSTI.

RELATIVE ENTHALPY OF BERYLLIUM 1:3-ALUMINATE, BeO.3Al2O3, FROM 273 TO 1173K. THERMODYNAMIC PROPERTIES FROM 273 TO 2150K,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 11B.
AD-657 678 Not available from CFSTI.

DESULFURIZATION OF LIQUID HYDROCARBON FUEL FOR FUEL CELLS.
Pratt and Whitney Aircraft East Hartford Conn
For primary bibliographic entry see Field 10B.
AD-657 685 HC$3.00 MF$0.65

ANIONIC POLYMERIZATION OF ISOPRENE. ION AND ION-PAIR CONTRIBUTIONS TO POLYMERIZATION IN TETRAHYDROFURAN,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
S. Bywater, and D. J. Worsfold. 7 Mar 67. 5p
NRC-9500
Availability: Published in Canadian Journal of Chemistry v45 p1821-4 1967.

Descriptors: (*Isoprene, *Polymerization), Reaction kinetics, Catalysis, Metalorganic compounds, Lithium compounds, Electrical conductance, Ions, Dissociation, Organoboranes, Molecular weight, Nuclear magnetic resonance.

The kinetics of the propagation reaction in the polymerization of isoprene initiated by butyllithium in tetrahydrofuran solution were studied. The kinetic behavior indicated that the reactive species involves both the polyisoprenyllithium ion-pair and the free polyisoprenyl carbanion. The conductances of solutions of polyisoprenyllithium were measured and the ionic dissociation constant derived. From these the free ion rate constant was evaluated. It was also shown that the free ion reaction may be suppressed by the common ion effect when the salt lithium tetraphenylboron is added. The rate constants for the ion-pair and free ion are 0.20/M/s and 2800/M/s respectively; the ionic dissociation constant is 5.0 x 10 to the -10th power. Nuclear magnetic resonance determinations of the structures of the polymers formed primarily by the free carbanion, and by the ion-pair only, show that the lithium ion has only a small directing effect. (Author)
AD-657 698 Not available from CFSTI.

REACTION OF OXYGEN ATOMS WITH ETHANOL,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
A. Kato, and R. J. Cvetanovic. 18 Jan 67. 18p
NRC-9473
Availability: Published in Candian Journal of Chemistry v45 p1845-61 1967.

Descriptors: (*Ethanols, Oxidation), (*Oxygen, Chemical reactions), Atomic energy levels, Water, Aldehydes, Glycols, Reaction kinetics, Mercury, Photochemistry, Canada.

Reaction of O (3P) atoms with ethanol in the vapor phase was studied at room temperature. The principal initial reaction products are water, acetaldehyde, and 2,3-butanediol. The data are consistent with abstraction of an alpha-hydrogen from ethanol as the primary step in the reaction. Ethanol is found to react with O (3P) atoms about 3.5 times less rapidly than acetaldehyde. The approximate absolute value of the rate constant of the ethanol reaction at 25C is 6.2 x 10 to the 10th power cu cm/mole/s. As a corollary to the investigation of the reaction of oxygen atoms with ethanol, a brief study was made of the mercury Hg 6 (3P1) photosensitized decomposition of ethanol at room temperature. (Author)
AD-657 699 Not available from CFSTI.

PRESSURE BROADENING OF ROTATIONAL LINES: SUDDEN PERTURBATION APPROXIMATION,
Tufts Univ Medford Mass Dept of Chemistry
C. O. Trindle, and K. H. Illinger. 11 Jan 67. 9p
Research supported in part by ONR.
Availability: Published in The Journal of Chemical Physics v46 n9 p3429-37 May 1 1967.

Descriptors: (*Molecular spectroscopy, Pressure), (*Line spectrum, Perturbation theory), Molecular association, Interactions, Approximation (Mathematics), Microwave spectroscopy.

A treatment, within the framework of the sudden perturbation approximation of time-dependent perturbation theory, of the pressure broadening of rotational transitions is presented. The Lorentz line-shape expression is derived in the limit of low pressures, and explicit expressions for the frequency-shift and line-width parameters are given in terms of the intermolecular potential. Detailed comparison to other perturbation theories of line broadening is made. (Author)
AD-657 706 Not available from CFSTI.

THE HEAT OF FORMATION OF BORON TRIFLUORIDE BY DIRECT COMBINATION OF THE ELEMENTS,
National Bureau of Standards Washington D C Inst for Basic Standards
Eugene S. Domalski, and George T. Armstrong. 27 Jan 67. 10p
AFOSR-67-2017
Availability: Published in Journal of Research on the National Bureau of Standards--A. Physics and Chemistry v71A n3 p195-202 May-Jun 1967.

Descriptors: (*Boron compounds, *Heat of formation), (*Fluorides, Heat of formation), Boron, Fluorine, Thermochemistry, Calorimetry, Combustion.
Identifiers: Boron fluoride.

The energy of combination of crystalline boron in gaseous fluorine was measured in a bomb calorimeter. The experimental data combined with reasonable estimates of all known errors may be expressed by the equation: B (c) + 3/2F2 (g) = BF3 (g), heat of formation = -271.03 plus or minus 0.51 kcal/mol. This result is compared with other recent work on and related to the heat of formation of boron trifluoride. (Author)
AD-657 731 Not available from CFSTI.

MEASURED RELATIVE ENTHALPY OF ANHYDROUS CRYSTALLINE ALUMINUM TRIFLUORIDE, AlF3, FROM 273 TO 1173K AND DERIVED THERMODYNAMIC PROPERTIES FROM 273 TO 1600K,
National Bureau of Standards Washington D C Inst for Basic Standards
Thomas B. Douglas, and David A. Ditmars. 27 Jan 67. 11p
AFOSR-67-2014
Availability: Published in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry v71A n3 p185-93 May-Jun 1967.

Descriptors: (*Aluminum compounds, Thermal properties), (*Fluorides, Thermal properties), Enthalpy, Calorimetry, High-temperature research, Phase studies, Thermodynamics, Specific heat.
Identifiers: Aluminum fluorides.

The enthalpy of a high-purity sample of anhydrous crystalline aluminum trifluoride, relative to that at 0C (273.15K), was precisely measured with an ice calorimeter and a 'drop' method at 18 temperatures starting at 50C and proceeding in 50-deg steps to 900C (1173.15K). Thirty additional enthalpy measurements between 450 and 453C revealed a gradual transition. A simple general relation for the progress of transition when impurity is in solid solution is derived. The relation fits the observed transition data and indicates a first-order transition temperature of 455C (728K). X-ray powder patterns on the sample, measured in the Crystallography Section of the NBS, established the existence of a phase transition by showing not only the known hexagonal structure at room temperature (even after violent quenching from above the transition temperature region) but a new, simple-cubic structure at 570C (843K). The smooth heat-capacity curve formulated from the data merges very smoothly with that representing published precise low-temperature data. The common thermodynamic properties were derived, and are tabulated at and above 273.15K, with extrapolation up to 1600K. (Author)
AD-657 732 Not available from CFSTI.

THE HEATS OF COMBUSTION OF POLYTETRAFLUOROETHYLENE (TEFLON) AND GRAPHITE IN ELEMENTAL FLUORINE,
National Bureau of Standards Washington D C Inst for Basic Standards
E. S. Domalski, and G. T. Armstrong. 16 Dec 66. 16p
AFOSR-67-2013
Availability: Published in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry v71A n2 p105-18 Mar-Apr 1967.

Descriptors: (*Heat-resistant materials, *Heat of combustion), (*Halocarbon plastics, Heat of combustion), (*Graphite, Heat of formation), (*Fluorine, *Combustion), Aluminum compounds, Fluorides, Halogenated hydrocarbons, Fluorine compounds, Heat of formation, Calorimetry, Mass spectroscopy, Combustion products, Hydrogen compounds, Composite materials.
Identifiers: Aluminum fluorides, Carbon tetrafluoride, Hydrogen fluoride.

Bomb calorimetric measurements are reported for the combustion in fluorine of polytetrafluoroethylene (Teflon) and graphite-polytetrafluoroethy-

lene mixtures. Mass spectrometric examination of the product gases showed CF4 to be the only major product with C2F6 (g) present in only very small amounts. The completeness of combustion of the graphite was determined by chemical analysis of combustion residues and found to range from 97 to better than 99 percent. From the combustion data, the heats of formation of CF4 (g) and C2F4 (solid polymer) were determined to be -222.97 plus or minus 0.38 kcal/mol and -197.82 plus or minus 0.39 kcal (gfw C2F4), respectively. The uncertainties are estimates of the overall experimental errors. A previously reported value for the heat of formation of AlF3 (c) is adjusted to be consistent with the present work. An evaluation of other data on CF4 is presented. The heat of formation of CF4 (g) is combined with other work to derive the heats of formation of HF solutions at three specific concentrations. (Author)
AD-657 733 Not available from CFSTI.

FIRST LIMIT OF THE HYDROGEN + OXYGEN REACTION IN VESSELS COATED WITH BARIUM BROMIDE,
Manchester Coll of Science and Technology (England) Dept of Chemistry
For primary bibliographic entry see Field 21B.
AD-657 737 Not available from CFSTI.

KINETICS OF THE ATTACK OF HIGH-TEMPERATURE MOLYBDENUM AND TUNGSTEN BY ATOMIC OXYGEN.
Revised ed.,
Aerochem Research Labs Inc Princeton N J
Daniel E. Rosner, and H. Donald Allendorf. 15 Dec 66, 13p
AFOSR-67-1986
Contract AF 49 (638)-1637
Prepared for presentation at Philadelphia Meeting 9-14 Oct 66. Revision of manuscript received 2 Jul 66.
Availability: Published in Journal of Electrochemical Soc v114 n4 p305-14 1967.

Descriptors: (*Electrochemistry, *Molybdenum), (*Tungsten, Oxidation), Dynamics, Heterogeneous reactors, Microwaves, High-temperature research, Atomic properties, Oxygen, Filaments, Atoms, Pressure, Chemisorption, Refractory metals.

Using microwave-discharge/fast-flow system techniques coupled with resistance heating and monitoring of the reacting specimens, true rates of metal atom removal for polycrystalline molbdenum and tungsten filaments attacked by atomic oxygen have been obtained in the temperature range 1000K-2200K at oxygen atom pressures in the range 0.001 to 0.05 Torr. Under these conditions the oxides of molybdenum and tungsten volatilize as rapidly as they are formed, continuously leaving the metal surface vulnerable to direct oxygen atom attack at constant (time independent) rates. Reaction probabilities are found to be up to 140 times those for O2, are independent of O-atom partial pressure, and exhibit a much weaker temperature dependence than those for O2. These observations are in accord with a Rideal-type mechanism in which O-atoms from the gas phase strike chemisorbed oxygen, leading either to product formation and desorption, or surface catalyzed atom recombination. (Author)
AD-657 739 Not available from CFSTI.

CORRECTION TO THE ENERGY OF A CRYSTAL IN THE AMO APPROXIMATION,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20B.
AD-657 740 Not available from CFSTI.

THE SYNTHESIS AND PROPERTIES OF SOME DITHIOSEMICARBAZONES,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
D. M. Wiles, B. A. Gingras, and T. Suprunchuk. 27 Feb 67, 10p
NRC-9555
Availability: Published in Canadian Journal of Chemistry v45 p1735-43 1967.

Descriptors: (*Synthesis (Chemistry), Infrared spectroscopy), Copper compounds, Absorption, Fungicides, Aldehydes, Polymers, Chemical bonds, Thiocyanates, Hydrates, Aromatic compounds, Ethylenes, Aliphatic compounds.
Identifiers: Dithiosemicarbazones.

A series of new compounds has been prepared by reacting aliphatic and aromatic aldehydes with ethylene dithiosemicarbazide. The nature of these new dithiosemicarbazones has been deduced from their infrared spectra, from the products of the ferric chloride induced oxidation of two of them, and from the formation of 1:1 copper complexes of several of them. Since the copper complexes are paramagnetic, the copper must be present in the cupric oxidation state. A structure has therefore been proposed for the complexes which involves bonding between copper and both thiocarbonyl groups in the dithiosemicarbazone molecule. Several of the compounds prepared in this work exhibit an antifungal action against the cellulolytic microorganism Chaetomium globosum. (Author)
AD-657 741 Not available from CFSTI.

KINETIC AND EQUILIBRIUM STUDIES OF THE THERMAL DECOMPOSITION OF 2-METHYL-2-PROPANOL,
Lund Univ (Sweden) Thermochemistry Lab
S. Sunner, and S. -a. Thoren. 16 Nov 66, 10p
AFOSR-67-1989
Grant AF-EOAR-34-64
Availability: Published in Acta Chemica Scandinavica v21 n2 p565-73 1967.

Descriptors: (*Propanols, *Pyrolysis), (*Butanols, Pyrolysis), Reaction kinetics, Calorimetry, Chemical equilibrium, Pressure, Free energy, Thermochemistry, Sweden.

The thermal decomposition of 2-methyl-2-propanol was studied at 153C with a semi-automatic pyrolysis apparatus. The initial rate constants at various pressures of the butanol (20 to 0.15 mm Hg) usually mixed with argon, in some experiments with oxygen, were measured. The change of the reaction order depending on the reactant pressure was observed. The equilibrium constant for the reaction: (CH3)3COH= (CH3)2C=CH2 + H2O was determined and the free energy change at 153C calculated to be -3.21 plus or minus 0.04 kcal/mole. (Author)
AD-657 761 Not available from CFSTI.

ENERGY OF COMBUSTION AND DIFFERENTIAL THERMOGRAMS OF ORGANIC AZIDES,
Aerospace Corp El Segundo Calif Labs Div
Genevieve C. Denault, Paul C. Marx, and Hideyo H. Takimoto. May 67, 22p Rept no. TR-1001 (2210-10)-5
SSD-TR-67-128
Contract AF 04 (695)-1001

Descriptors: (*Azides, Thermal properties), (*N-heterocyclic compounds, Thermal properties), Heat of combustion, Heat of formation, Differential thermal analysis, Thermal stability, Thermal shock, Sensitivity, Calorimetry, Propellants.
Identifiers: Amino azido triazoles, Azido triazoles.

The heats of formation of two series of triazoles, 3-azido-s-triazoles, and 4-amino-3-azido-s-triazoles, were determined from the heat of combustion in an oxygen bomb calorimeter. Differential thermograms were obtained to determine the thermal stability of each compound. Of the series of azides studied, the 3-azido-s-triazoles offer greater promise in propellant applications due to their thermal stability and shock insensitivity. (Author)
AD-657 768 HC$3.00 MF$0.65

AIR AND NITROGEN CONDENSATION IN HYPERSONIC NOZZLE FLOW,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-657 772 HC$3.00 MF$0.65

CHEMICAL KINETICS OF ENTRY INTO THE MARTIAN ATMOSPHERE.
Ohio State Univ Columbus Aeronautical and Astronautical Research Labs
For primary bibliographic entry see Field 3B.
AD-657 778 HC$3.00 MF$0.65

INTERMOLECULAR POTENTIAL ENERGIES BY A MOLECULAR BEAM SCATTERING METHOD.
Annual rept. 1 May 66-30 Apr 67,
General Dynamics/Convair San Diego Calif Space Science Lab
Erhard W. Rothe. May 67, 36p Rept no. GDC-DBE-67-017
AFOSR-67-2011
Contract AF 49 (638)-1730

Descriptors: (*Molecular beams, Interactions), (*Lithium, Molecular beams), Scattering, Instrumentation, Probability, Potential energy, Reaction kinetics.

A crossed molecular beam machine was constructed and tested. Mechanical velocity selection is used to obtain monoenergetic beams. Each beam is chopped, and the resulting doubly modulated output signal is analyzed. The energy range is from 0.02-0.95 eV. The velocity dependence of the total collision cross section was measured for the scattering of lithium atoms by 18 different atoms and molecules. Data analysis is not complete, but the results will lead to potential energy information relevant to chemical reactions. (Author)
AD-657 784 HC$3.00 MF$0.65

HEAT OF FORMATION AND TRANSITION TEMPERATURES OF SOLID LITHIUM HEXAFLUOROALUMINATE,
Fulmer Research Inst Ltd Stoke Poges (England)
P. Gross, P. D. Greene, and C. Hayman. 1 Mar 67, 13p Rept no. R.163/SR.2
AFOSR-67-1984
Contract AF 61 (052)-447

Descriptors: (*Lithium compounds, Thermochemistry), (*Fluorine compounds, *Thermochemistry), (*Aluminates, Thermochemistry), Calorimetry, Heat of reaction, Transition temperature, Crystal structure, Phase studies, X-ray diffraction analysis, Great Britain.
Identifiers: Lithium hexafluoroaluminate.

A direct calorimetric determination of the heat of the reaction 3LiF (c) + AlF3 (c) yields Li3AlF6 (c) gave a value of -5.4 plus or minus 0.5 kcal/mole. Five solid forms of Li3AlF6 were identified by high temperature X-ray powder photography and transition temperatures estimated. (Author)
AD-657 785 HC$3.00 MF$0.65

HEATS OF FORMATION OF THE FLUOBORATES OF LITHIUM, SODIUM AND POTASSIUM.
Research rept.,
Fulmer Research Inst Ltd Stoke Poges (England)
P. Gross, C. Hayman, and H. A. Joel. 3 May 67, 22p Rept no. R.163/SR.3
AFOSR-67-1985
Contract AF 61 (052)-863

Descriptors: (*Fluoborates, *Thermochemistry), (*Lithium compounds, Thermochemistry), (*Sodium compounds, Thermochemistry), (*Potassium

compounds, Thermochemistry), Heat of formation, Heat of solution, Fluorides, Calorimetry, Great Britain.
Identifiers: Lithium fluoborate, Sodium fluoborate, Potassium fluoborate.

Heats of formation of LiBF4 (c) and NaBF4 (c) from the constituent fluorides, solid alkali fluoride and boron trifluoride gas, at 110C were measured directly. The heat of formation of KBF4 (c) from the constituent fluorides at 25C, based on that of NaBF4 (c), was determined by comparing the heats of solution in hydrofluoric acid of the pair, NaBF4 (c) + KF (c), with that of the pair KBF4 (c) + NaF (c). The following values were obtained: -21.40 plus or minus 0.09 kcal/mole for LiBF4; -32.04 plus or minus 0.12 kcal/mole for NaBF4; -43.13 plus or minus 0.22 kcal/mole for KBF4. With the known values of the heats of formation of BF3 (gas), LiF (c), NaF (c) and KF (c), one arrives at the heats of formation of the fluoborates: -439.4 plus or minus 0.7 kcal/mole for LiBF4; -440.6 plus or minus 0.5 kcal/mole for NaBF4; -450.2 plus or minus 0.5 kcal/mole for KBF4.
AD-657 786 HC$3.00 MF$0.65

THEORY OF GAS-SURFACE COLLISIONS,
Massachusetts Inst of Tech Cambridge Fluid Dynamics Research Lab
Leon Trilling. Dec 66, 39p Rept no. 66-7
AFOSR-66-2736
Contract AF 49 (638)-1601

Descriptors: (*Gases, *Statistical mechanics), Crystal lattices, Surfaces, Interactions, Quantum statistics, Molecular energy levels.

A theory of gas surface interaction should predict the distribution of molecules re-emitted from a surface in function of the properties of the incident flux and the physics of the surface. It depends on our uncertain knowledge of free-bound heterogeneous molecule interactions and our equally uncertain knowledge of atomic lattice dynamics. The paper critically summarizes and compares with experimental results an increasingly detailed lattice model which gives plausible energy exchange predictions and a geometrical (hard cube) model which shows promise as a correlator of data on scattering direction distribution. Both these models are based on classical interaction mechanisms; some potential generalizations to quantum models are suggested. (Author)
AD-657 795 HC$3.00 MF$0.65

THE PHYSICS OF METASTABLE SYSTEMS.
Final rept. 1 Feb 66-31 Jan 67,
Texas Univ Austin Dept of Physics
W. W. Robertson. May 67, 15p
AFOSR-67-1988
Grant AF-AFOSR-273-66

Descriptors: (*Helium group gases, Molecular energy levels), Gas discharges, Helium, Argon, Krypton, Xenon, Excitation, Continuous spectrum, Reaction kinetics, Pumping (Optical), Afterglows, Absorption spectrum.

A summary is given of studies involving the various processes for the production and destruction of energetic species of the rare gases. The program of investigation involved the determination of all the various mechanisms for reaction together with the rate constants and the dependence of these upon gas and electron temperatures, densities, impurities, container size and walls, etc. Many of these reactions were investigated in active discharges as well as in afterglows. The main diagnostic tool was spectroscopy, either emission or absorption depending upon the nature of the system under investigation.
AD-657 805 HC$3.00 MF$0.65

STUDY OF THE EFFECT OF LIQUID ENVIRONMENT ON THE EMBRITTLEMENT OF SOLIDS.
Final rept. 1 Jan 59-31 Dec 66,
New York Univ N Y Research Div
I. B. Cadoff. Jun 67, 63p
Contract Nonr-285 (43)

Descriptors: (*Embrittlement, *Solids), (*Liquids, Embrittlement), Copper alloys, Mercury, Liquid metals, Microstructure, Grain size, Adsorption, Grain boundaries, Stresses, Fracture (Mechanics), Silver compounds, Chlorides, Solutions, Ductility, Mercury alloys.

The effect of environment on the mechanical properties of solids was investigated. The two principal systems studied were: The embrittlement of copper and copper alloys in mercury and mercury amalgams. The embrittlement of silver chloride in aqueous solutions. The principal factors studied were alloy composition; microstructure, including grain size, precipitation effects, grain boundary orientation relationships; and composition of the liquid environment. In general it was found that embrittlement could be attributed to adsorption of 'active' ions at sites of high stress concentration in the solid, with this adsorption resulting in lower cohesion between solid-solid bonds. High stress concentrations are associated with the dislocation interactions at high angle grain boundaries, precipitates and notches. (Author)
AD-657 854 HC$3.00 MF$0.65

INFRARED SPECTRA OF SOLID AND MATRIX-ISOLATED (CH3)3N, (CD3)3N, AND (SiH3)3N,
State Univ of New York Buffalo
Theodore D. Goldfarb, and Bishun N. Khare. 17 Jun 66, 8p
AFOSR-67-2040
Grant AF-AFOSR-277-63
Availability: Published in Journal of Chemical Physics v46 n9 p3379-84 May 1 1967.

Descriptors: (*Amines, *Infrared spectroscopy), (*Silanes, Infrared spectroscopy), Deuterated compounds, Argon, Solidified gases, Solid solutions, Band spectrum, Intensity.
Identifiers: Trisilyl amines, Trimethyl amines.

The argon-matrix infrared spectra of (CH3)3N, (CD3)3N, and (SiH3)3N are used to deduce a more complete assignment of the fundamental vibrational modes of these molecules than has previously been possible. Evidence is presented in support of a C3v rather than C3h point-group symmetry for trisilylamine. Barriers to internal rotation are calculated from the observed asymmetric torsional fundamentals of (CH3)3N in the solid and matrix phases and of (CD3)3N in the gaseous phase. (Author)
AD-657 888 Not available from CFSTI.

SCATTERING OF MOLECULAR BEAMS OF He, D2 AND H2 FROM THE (111) PLANE OF Ag,
General Dynamics San Diego Calif General Atomic Div
Howard Saltsburg, Joe N. Smith, Jr., and Robert L. Palmer. 1967, 18p
AFOSR-67-2052
Contract AF 49 (638)-1435
Availability: Published in Rarefied Gas Dynamics, 5th Symposium v1 p223-37 1967.

Descriptors: (*Molecular beams, Scattering), (*Silver, Surface properties), Hydrogen, Helium, Deuterium, Single crystals, Interactions.

The spatial distributions of H2, He, and D2 scattered from the (111) plane of epitaxially grown Ag were measured both in, and transverse to, the plane of incidence. All three gases show sharper distributions out-of-plane than in-plane. Both H2 and He show, in addition to a specular scattering maximum, another temperature dependent scattering peak, which is nonspecular at 80K and becomes specularly directed at 1400K. This nonspecular peak is assumed to be a result of energy-transfer processes. For D2, the specular peak is very much smaller, the temperature-dependent scattering dominating the observed distribution. The elastic specular peak is due to < 5% of the scattered atoms for He and H2 and < 0.5% for D2. Rather than resulting solely from the difference in the magnitude of the interaction potential, evidence is presented indicating that rotational-state interactions of the diatomic molecule contribute to the differences in the scatterings of He and D2. (Author)
AD-657 895 Not available from CFSTI.

TRANSIENT FREE RADICALS,
Padua Univ (Italy)
L. C. Snyder, A. M. Trozzolo, and E. Wasserman. 1966, 4p
AFOSR-67-2054
Grant AF-EOAR-1-66
Availability: Published in Science v154 n3750 p802-6 Nov 11 1966.

Descriptors: (*Free radicals, Symposia), Quantum mechanics, Gas analysis, Ultraviolet radiation, Photochemistry, Molecular energy levels, Complex compounds.
Identifiers: Solvated electrons.

The Seventh International Symposium on Free Radicals was held September 5-10, 1965 at the University of Padua, Italy. Six sessions on Quantum Theory, gas-phase detection, Mass Spectrometry, Far Ultraviolet Photochemistry, Solvated Electrons and Excited Species of Free Radicals are reviewed. (Author)
AD-657 900 Not available from CFSTI.

HYDROGEN-ABSTRACTION REACTIONS BY ETHYL RADICALS FROM METHYLAMINES AND HYDRAZINE,
University Coll of Wales Aberystwyth Edward Davies Chemical Lab
D. A. Edwards, J. A. Kerr, A. C. Lloyd, and A. F. Trotman-Dickenson. 12 Apr 66, 7p
AFOSR-67-2043
Grant AF-EOAR-0023-63
Availability: Published in J. Chem. Soc. SecA p1500-3 1966.

Descriptors: (*Hydrazine, Dehydrogenation), (*Amines, Dehydrogenation), (*Dehydrogenation, Reaction kinetics), Thermochemistry, Pentanones, Photolysis, Heat of activation, Great Britain.
Identifiers: Methyl amines, Dimethyl amines, Trimethyl amines.

By photolysis of diethyl ketone in the presence of the amine or hydrazine Arrhenius parameters were obtained for hydrogen-abstraction reactions of the ethyl radicals with methylamine, dimethylamine, trimethylamine, and hydrazine. The activation energy for attack of ethyl radicals on hydrazine is similar to that for attack of methyl radicals on hydrazine despite the additional 6 kcal. exothermicity of the latter reaction. It appears that alkyl radicals have the same reactivity in hydrogen-abstractions when the substrate contains a relatively weak X-H bond. The results for reactions of ethyl radicals with methylamines are compared with the analogous reactions involving methyl radicals.
AD-657 901 Not available from CFSTI.

INFRARED STUDIES OF DIMETHYLSILYAMINE AND METHYLDISILYAMINE BY THE MATRIX-ISOLATION TECHNIQUE,
State Univ of New York Stony Brook Dept of Chemistry
Theodore D. Goldfarb, and Bishun N. Khare. 17 Jun 66, 7p
AFOSR-67-2041
Grant AF-AFOSR-277-63
Presented in part at the Symposium on Molecular Structure and Spectroscopy, Columbus, Ohio, June, 1964.

Availability: Published in Journal of Chemical Physics v46 n9 p3384-8 May 1 1967.

Descriptors: (*Amines, *Infrared spectroscopy), (*Silanes, Infrared spectroscopy), Solidified gases, Argon, Solid solutions, Band spectrum, Molecular association, Molecular orbitals, Molecular structure.
Identifiers: Dimethyl silylamines, Methyl disilylamines, Silylamines.

A partial assignment of the fundamental vibrational modes of (CH3)2SiH3N and CH3 (SiH3)2N is proposed based on the infrared spectra of the matrix-isolated molecules. Calculated and observed vibration-rotation band envelopes are compared and are found to be indicative of a pyramidal skeleton for the monosilyl molecule and a planar skeleton for the disilyl molecule. Compelling evidence for the intermolecular association through p to d bonding in (CH3)2SiH3N is presented in the form of radical changes in the infrared absorption spectrum as the concentration of this molecule in an argon matrix is increased. Although the structure of the associated molecules can not be deduced from the complicated spectrum of the solid, several conceivable geometries are discussed. (Author)
AD-657 902 Not available from CFSTI.

COMMENTS ON THE BLOOM-OPPENHEIM THEORY OF SPIN RELAXATION,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
J. W. Riehl, J. L. Kinsey, and J. S. Waugh. 25 Nov 66, 2p
Contract DA-36-039-AMC-03200 (E)
Research supported in part by NSF.
Availability: Published in The Journal of Chemical Physics v46 n11 p4546-8 Jun 1 1967.

Descriptors: (*Hydrogen, Nuclear spins), (*Nuclear spins, Relaxation time), Gases, Scattering, Field theory, Quantum mechanics, Potential energy, Interactions, Helium.

Nuclear relaxation times in fluids may be related to correlation functions of lattice variables which depend only on the equilibrium properties of the fluid. A calculation was carried out for a case in which quantum effects were expected to be important: H2 gas (J=1) infinitely dilute in He. The cross sections were obtained by a quantum-mechanical scattering calculation using the distorted wave approximation (DWA). The results indicate that the Oppenheim-Bloom theory applied to dilute gases appears to be consistent with scattering theory for the combinations (a) short-range potential and classical dynamics or (b) long-range potentials and quantum dynamics. It is not valid for short-range potentials with quantum dynamics and probably not for long-range potentials with strongly quantum-mechanical dynamics.
AD-657 906 Not available from CFSTI.

PROTON RELAXATION IN POTASSIUM-AMMONIA SOLUTIONS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
R. A. Newmark, J. C. Stephenson, and J. S. Waugh. 4 Aug 66, 6p
Contract DA-36-039-AMC-03200 (E)
Research supported in part by NSF.
Availability: Published in The Journal of Chemical Physics v46 n9 p3514-9 May 1 1967.

Descriptors: (*Protons, Nuclear magnetic resonance), (*Nuclear spins, Relaxation time), (*Ammonia, Solutions), Potassium, Electrons, Paramagnetic resonance, Concentration (Chemistry), Temperature.
Identifiers: Metal-ammonia solutions, Spin-lattice relaxation.

The spin-lattice relaxation time, T1, for protons in potassium-liquid- ammonia solutions has been determined over a wide range of concentrations (0.0002M to 3M) and temperatures (-74 to +21C). 1/T1 for pure ammonia was determined over the same temperature range and found proportional to the viscosity divided by the temperature. The relaxation rate due to the paramagnetic electrons, 1/T1K, rises with increasing potassium concentration to a maximum at about 0.15M, then decreases as the concentration is increased further. It was determined that the electron correlation time is about 4 x 10 to the -13th power sec up to the 1/T1K maximum and then decreases rapidly at higher potassium concentrations. (Author)
AD-657 907 Not available from CFSTI.

EFFECT OF ELECTROMAGNETIC FORCE ON THE STABILITY OF LIQUID FILMS.
Revised ed.,
Illinois Univ Urbana Dept of Electrical Engineering
Joseph M. Crowley. 6 Feb 67, 6p
AFOSR-67-2060
Grant AF-AFOSR-107-66
Revision of manuscript submitted 25 Apr 66.
Availability: Published in I/EC Fundamentals v6 p243-6 May 1967.

Descriptors: (*Films, Liquids), (*Electromagnetic fields, *Liquids), Stability, Gravity, Rocket motor nozzles, Magnetic fields, Physical properties, Viscosity, Partial differential equations.

Steady electric and magnetic fields normal to each other and to the undisturbed surface are applied to a film of poorly conducting liquid flowing down an inclined solid plane under the influence of gravity. This combination of fields exerts a force normal to the undisturbed surface of the film which either stabilizes or destabilizes the flow, depending on the relative directions of the two fields. This force is independent of the orientation of the film, and thus can be effective in stabilizing the flow in a vertical or inverted film. The electromagnetic force must be on the order of the gravitational force normal to the undisturbed surface to be significant. (Author)
AD-657 915 Not available from CFSTI.

KINETIC EQUATION WITH ELECTROMAGNETIC INTERACTIONS,
Northwestern Univ Evanston Ill Technological Inst
For primary bibliographic entry see Field 20I.
AD-657 916 Not available from CFSTI.

LINE BROADENING OF LIGHT SCATTERED FROM A LIQUID SURFACE,
Massachusetts Inst of Tech Cambridge Dept of Physics
For primary bibliographic entry see Field 20F.
AD-657 922 Not available from CFSTI.

CHEMICAL RATE PROCESSES AND MAGNETIC RESONANCE LINEWIDTHS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Ragnar A. Hoffman. 12 Dec 66, 2p
Contract DA-28-043-AMC-02536 (E)
Availability: Published in Journal of Chemical Physics v46 n8 p3277-8 Apr 15 1967.

Descriptors: (*Reaction kinetics, *Nuclear magnetic resonance), Absorption, Line spectrum, Perturbation theory, Relaxation time.

Allerhand and Thiele (J. Chem. Phys. v45 p902 1966) derived a generalized form of Piette and Anderson's expression for the residual contribution of fast chemical exchange to the width of a high-resolution NMR absorption spectrum. It is now shown that the second-order result of Allerhand and Thiele may alternatively be derived by making the appropriate expansion of the line-shape function and that a Lorentzian line shape (corresponding to the dominant exponential of the induction decay) is indeed predicted to second order in the perturbation expansion. However, in higher order the Lorentzian line shape will be destroyed, and it is then insufficient to retain only one decay constant.
AD-657 926 Not available from CFSTI.

WIPED FILM CONDENSATION.
Research and development rept.,
Navy Marine Engineering Lab Annapolis Md
J. A. Bauman. Mar 67, 38p Rept no. MEL-505/66

Descriptors: (*Steam, *Condensation), (*Steam condensers, Films), Heat transfer coefficients, Windshield wipers, Drops, Cylindrical bodies, Data, Liquids, Theory, Velocity, Design, Measurement, Marine engineering.

The advantages of periodic mechanical removal of steam condensate from a condensing surface have been examined experimentally and theoretically, using the theory of Sparrow and Siegel. High time average condensing heat transfer coefficients, hc = 5000 Btu per (hr) (sq ft) (deg F), have been obtained at high heat loadings, Phi = 94,000 Btu per (hr) (sq ft). Prediction of this augmentation, achieved with conventional windshield wiper blades, compares favorably with the measured results. Applications of this principle will require a new concept in condenser configuration, perhaps similar to the hollow cylindrical model used in this study. A design study is being made for a specific shipboard application. (Author)
AD-657 940 HC$3.00 MF$0.65

NOZZLE FLOWS WITH COUPLED VIBRATIONAL AND DISSOCIATIONAL NONEQUILIBRIUM,
Toronto Univ (Ontario) Inst for Aerospace Studies
For primary bibliographic entry see Field 20D.
AD-657 944 HC$3.00 MF$0.65

THE SEMICONDUCTIVE PROPERTIES OF LIPIDS AND THEIR RELATION TO THE ELECTRICAL CONDUCTIVITY OF LIPID BILAYERS.
Michigan State Univ East Lansing Dept of Biophysics
For primary bibliographic entry see Field 6A.
AD-657 954 HC$3.00 MF$0.65

SIMPLIFIED PROCEDURES FOR ESTIMATING BAND AND TOTAL EMISSIVITIES OF POLYATOMIC MOLECULES,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
S. S. Penner, and P. Varanasi. 1967, 9p
Contract Nonr-2216 (24)
Availability: Published in Symposium (International) on Combustion (11th), p569-76 1967.

Descriptors: (*Combustion products, *Molecular spectroscopy), (*Carbon dioxide, Emissivity), (*Water vapor, Emissivity), Polyatomic molecules, Band spectrum, Absorption spectrum, Continuous spectrum.

A qualitative description is presented of the essential physical ideas which were used in obtaining a successful molecular description of Hottel's empirical emissivity charts for CO2, H2O, and for CO2-H2O mixtures. (Author)
AD-657 982 Not available from CFSTI.

SPECTRAL ABSORPTION COEFFICIENTS IN THE PURE ROTATION SPECTRUM OF WATER VAPOR,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
S. S. Penner, and P. Varanasi. 27 Dec 66, 5p
Contract Nonr-2216 (24)

Availability: Published in J. Quant. Spectrosc. Radiat. Transfer v7 p687-90 1967.

Descriptors: (*Water vapor, *Molecular spectroscopy), Absorption spectrum, Numerical analysis, Theory, Interactions, Band spectrum.

Measurements were made of the spectral absorption coefficients of the H2O vapor rotation spectrum (400-500K, 2-25 atm) and the results were evaluated by the use of the 'just-overlapping line model'. The possible origin of descrepancies between the values obtained and the values in the literature is discussed.
AD-657 983 Not available from CFSTI.

A GENERAL FORMULATION AND SOLUTION OF CHEMICAL RATE EQUATIONS FOR USE IN NON-EQUILIBRIUM COMBUSTION STUDIES,
California Univ Berkeley Thermal Systems Div
For primary bibliographic entry see Field 20B.
AD-658 004 HC$3.00 MF$0.65

THE NUMERICAL INTEGRATION OF KINETIC EQUATIONS FOR CHEMICAL SYSTEMS HAVING BOTH SLOW AND FAST REACTIONS,
Rand Corp Santa Monica Calif
R. J. Clasen. Sep 67, 67p Rept no. P-3547

Descriptors: (*Reaction kinetics, Integration), Chemical equilibrium, Matrix algebra, Equations, Algorithms, Subroutines, Numerical analysis.

A method is presented which speeds up the integration of kinetic equations for chemical systems having widely variant reaction rates. An algorithm is given for finding the conservation equations for a chemical system. An example is analyzed in detail using the given techniques. (Author)
AD-658 012 HC$3.00 MF$0.65

CONTINUED FRACTIONS AND UPPER AND LOWER BOUNDS IN THE BRILLOUIN - WIGNER PERTURBATION SCHEME,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20J.
AD-658 035 HC$3.00 MF$0.65

ASYMPTOTIC EXCHANGE COUPLING AND THE AMO METHOD,
Uppsala Univ (Sweden) Quantum Chemistry Group
E. Bosatta, and O. Goscinski. 1 May 67, 11p Rept no. Scientific-30
Contract AF 61 (052)-874

Descriptors: (*Hydrogen, Molecular orbitals), (*Molecular orbitals, Interactions), Molecular energy levels, Integrals, Wave functions, Sweden.

The calculation of the exchange coupling constant for two hydrogen atoms with the Heitler and London method gives the wrong sign in the asymptotic limit. The AMO formalism is used to show that the mixing of the polar state does not give an improvement. (Author)
AD-658 036 HC$3.00 MF$0.65

THE GROUND STATE OF ATOMIC TWO-ELECTRON SYSTEMS IN THE INDEPENDENT PARTICLE MODEL,
Uppsala Univ (Sweden) Quantum Chemistry Group
Marten J. ten Hoor. 1 Jul 67, 42p Rept no. Scientific-34
Contract AF 61 (052)-874

Descriptors: (*Atomic orbitals, Wave functions), (*Ground state, Wave functions), Hartree-Fock approximation, Helium, Special functions (Mathematical), Sweden.

Scaled variational functions of the form (Phi sub alpha (k)) = e exp. - (Z-1+e exp. - (alpha (kr)))kr, where Z is the nuclear charge and alpha is a parameter, and (Phi sub beta (alpha) (k)) = exp. - (beta + e exp - (alpha (kr)))kr, where both alpha and beta are parameters, are used for the description of the ground state of atomic two-electron systems in the independent particle model. The scale factor k has been introduced in order to satisfy the virial theorem. Apart from the energy, a number of one-electron expectation values have been calculated and the results are compared with those obtained from other variational functions. The function (Phi sub alpha (k)) yields already a good approximation to the Hartree-Fock solution whereas with the function (Phi sub beta (alpha) (k)) the Hartree-Fock results are practically reproduced. (Author)
AD-658 037 HC$3.00 MF$0.65

RELATIONS BETWEEN POINT DEFECTS IN THE COMPOUND M2X5,
Systems Research Labs Inc Dayton Ohio
For primary bibliographic entry see Field 20B.
AD-658 054 HC$3.00 MF$0.65

SURFACE POTENTIALS OF ADSORBED ORGANIC MONOLAYERS ON METALS.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
Peter Martin, Jr. Jul 67, 22p
R1A-67-1754

Descriptors: (*Organic coatings, *Monomolecular films), (*Lubricants, Surface properties), (*Antioxidants, Surface properties), Adsorption, Metals, Electrochemistry, Chromium, Carboxylic acids, Amines, Amides, Fatty acids, Oils, Steel.
Identifiers: Surface chemistry.

Surface potential measurements were accomplished to determine the effects of adsorbed organic monolayers on metal substrates. This data was used to characterize the monolayers as to their orientation, packing and polarization on metals. The vibrating condenser method was used to make surface potential measurements. The method is based on the principle of changing the capacity of a condenser formed by a reference electrode (Pt) and the metal to be studied. Any changes occurring on the metal will be detected by a potential change. Results obtained in this study were that (a) monolayers of acids, alcohols and amines absorbed on chrome cause an increase in the surface potential with an increase in carbon chain length; (b) oil solutions containing additives gave surface potentials in the order: octadecylamine > stearamide > stearic acid > octadecanol, and (c) temperature of wetting curves for the amines and amides correlated with surface potential curves. Conclusions derived were that (a) when alcohols, acids and amines of a sufficient chain length are adsorbed on chrome they form a close-packed oriented monolayer; (b) the tendency of adsorption from an oil solution onto steel depends on the type of additive used; and (c) amides with carbon chain lengths less than 16 have a higher energy of adsorption than the corresponding amines. (Author)
AD-658 058 HC$3.00 MF$0.65

APPLICATION OF THE AUGER PROCESS TO THE STUDY OF GASEOUS ADSORPTION ON TUNGSTEN,
Illinois Univ Urbana Coordinated Science Lab
Gary Tibbetts. Aug 67, 145p Rept no. R-363
Contract DA-28-043-AMC-00073 (E), Grant NsG-376

Descriptors: (*Chemisorption, Tungsten), (*Tungsten, Adsorption), (*Electron transitions, Adsorption), Surfaces, Ion bombardment, Electrons, Emissivity, Hydrogen, Carbon monoxide, Nitrogen, Foils, Molecular energy levels, Field emission, Cryogenics, Single crystals, Molecular association, Laboratory equipment.
Identifiers: Auger effect, Desorption, Surface chemistry.

Apparatus is described which allows the density of gas adsorbed on metal surfaces to be monitored by observing changes in the number of electrons ejected from the surface by a constant-current, low-energy ion beam. It is shown that the electron emission process (an Auger process) is temperature independent; thus, surface coverages may be easily compared at different temperatures. Adsorption at room temperature and at the temperature of liquid nitrogen was studied by flash filament and Auger techniques. Desorption kinetics of H2, CO, and N2 from polycrystalline, (110), and (111) tungsten foils are discussed.
AD-658 072 HC$3.00 MF$0.65

CHROMATOGRAPHY AND SOLVENT EXTRACTION OF ORGANO-METALLIC COMPLEXES.
Summary rept.,
Imperial Coll of Science and Technology London (England)
D. A. Pantony. 3 Aug 65, 14p Rept no. 2
Contract AF 61 (052)-663
See also AD-642 372.

Descriptors: (*Metalorganic compounds, *Complex compounds), (*Solvent extraction, Complex compounds), (*Chromatographic analysis, Complex compounds), Quinolinols, Synthesis (Chemistry), Chelate compounds, Sensitivity, Adsorption, Silica gel, Reaction kinetics, Great Britain.
Identifiers: Sequestering agents.

A summary is given of the progress of work in the following areas: Preparation of reagents with enhanced solvent extraction selectivity; synthesis of the various 2-alkyl substituted quinolin-8-ol derivatives; mechanistic and kinetic studies of metal 8-quinolinol complex adsorption of silica gel; practical applications of chromatographic separations.
AD-658 186 HC$3.00 MF$0.65

MOLECULAR INTERACTIONS AT SOLID SURFACES.
Final rept. 1 Jul 62-31 Dec 66,
California Univ Santa Barbara
P. W. Selwood. 31 Dec 66, 4p
Grants DA-ARO (D)-31-124-G323, DA-ARO (D)-31-124-G486

Descriptors: (*Chemisorption, *Catalysis), (*Hydrogen, Chemisorption), Iron, Cobalt, Nickel, Oxides, Chromium compounds, Iron oxides, Manganese compounds, Alumina, Nuclear magnetic resonance, Electron spin resonance.
Identifiers: Surface chemistry.

A brief summary is given of studies directed toward the gain of new information concerning the mechanisms by which vapor phase molecules adhere to, and chemically combine with, solid surfaces. Hydrogen received most attention. The adsorbents were the metals iron, cobalt, and nickel, and various metal oxides, including Cr2O3, Fe2O3, MnO, and Al2O3. The experimental methods included classical gas adsorption studies, magnetic and electron spin resonance, and the parahydrogen conversion. The work has directed toward a better understanding of catalytic reactions involving heterogeneous systems.
AD-658 201 HC$3.00 MF$0.65

ON GREY ABSORPTION COEFFICIENTS IN RADIATIVE TRANSFER.
Martin Co Baltimore Md Research Inst for Advanced Studies
For primary bibliographic entry see Field 20M.
AD-658 209 HC$3.00 MF$0.65

TRANSITION PROBABILITIES OF THE HYDROGEN ATOM FROM NONCOMPACT DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 239 Not available from CFSTI.

CALCULATION OF TRANSITION PROBABILITIES FROM NONCOMPACT DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 242 Not available from CFSTI.

STRUCTURE AND PROPERTIES OF LIQUID WATER,
California Univ Berkeley Dept of Electrical Engineering
M. Orentlicher, and P. O. Vogelhut. 28 Jun 66, 8p
AFOSR-67-2088
Grant AF-AFOSR-139-66
Availability: Published in Journal of Chemical Physics v45 n12 p4719-24 Dec 15 1966.

Descriptors: (*Water, Molecular properties), (*Molecular association, Water), Dielectric properties, Thermal properties, Nuclear magnetic resonance, Raman spectroscopy, Infrared spectroscopy, Transport properties, Biochemistry.

The properties of liquid water are shown to be explicable in terms of a short-range tetrahedral structure. Conclusions regarding transport processes in liquid water are of biological importance. (Author)
AD-658 245 Not available from CFSTI.

HALL EFFECT IN DIELECTRIC MEDIA: MICROWAVE X-BAND FARADAY ROTATION OF WATER ABSORBED ON HEMOGLOBIN,
California Univ Berkeley Dept of Electrical Engineering
Soo-Young Chai, and Paul O. Vogelhut. 8 Aug 66, 8p
AFOSR-67-2081
Grant AF-AFOSR-139-66
Availability: Published in Journal of Applied Physics v38 n2 p613-8 Feb 1967.

Descriptors: (*Water, *Magneto-optic effect), (*Molecular association, Water), (*Hall effect, Water), (*Hemoglobin, Hydrates), Dielectrics, Microwaves, X band, Polarization, Dipole moments, Proteins, Adsorption, Surface properties.

The structure of bound water molecules in crystalline, bovine hemoglobin powder was investigated with a microwave technique of Faraday rotation at a frequency of 9.36 Gc/sec. An expression for the Faraday rotation due to displacement-current Hall field was derived in terms of dipole concentrations of free water molecules and is applied to measure the changes from free water to bound water molecules on hemoglobin with variable amounts of adsorbed water. In agreement with the theory, the experimental result shows a linear relationship between the angle of rotation and the concentration of free water dipoles up to the hydration level of 0.13 g of water per gram of dry hemoglobin. Above this hydration level, the formation of icelike structures on the surface of hemoglobin is discussed based on the experimental results. (Author)
AD-658 246 Not available from CFSTI.

THE GROWTH AND ETCHING OF Si THROUGH WINDOWS IN SiO,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 20B.
AD-658 248 Not available from CFSTI.

THEORY OF POINT DEFECT ANNEALING IN METALS,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
For primary bibliographic entry see Field 20B.
AD-658 291 Not available from CFSTI.

CHARGE-TRANSFER INTERACTIONS OF THE HIGHER VALENCY HALIDES AND OXYHALIDES WITH AROMATIC HYDROCARBONS. BALL-PLANE INTERACTIONS. MEASUREMENTS OF WEAK INTERACTIONS AND LITERATURE REVIEW,
Naval Ordnance Test Station China Lake Calif
P. R. Hammond. Jun 67, 41p Rept no. NOTS-TP-4368

Descriptors: (*Complex compounds, Synthesis (Chemistry)), (*Aromatic compounds, Interactions), (*Halides, Interactions), Oxidation-reduction reactions, Molecular association, Stereochemistry, Colors, Freezing, Eutectics, Chemical equilibrium, Absorption spectrum, Molecular structure. Identifiers: Charge-transfer complexes, Oxyhalides.

The following generalizations are examined in a review of the chemical literature: (1) the covalent higher valency halides, oxyhalides, and oxides of the elements are molecules of high electron affinity, and will demonstrate charge-transfer absorptions with aromatic hydrocarbon donors; (2) as such donors produce firm complexes only in close, plane-to-plane combinations, and since the interactions will be mostly of the 'ball-plane' type for acceptor structures higher than and including the tetracoordinate state, all interactions will be very weak or just contact. Some brief experiments to test these views are described. In particular, the disappearance of color in frozen mixtures is a useful criterion of simple eutectic phase diagrams. Methods of measuring weak associations are discussed, and the spectral techniques outlined here, namely, equilibria studies in solution, temperature effects on absorption intensity, and color changes in the frozen mixtures, are concluded to be among the most discriminating. Although the evidence is incomplete, the proposals seem to be correct, and the weak interactions are discussed in terms of geometric incompatibility. The positions of the charge-transfer transitions and the relative acceptor strengths are examined in terms of the structures of the molecules. (Author)
AD-658 333 HC$3.00 MF$0.65

LASER RAMAN SCATTERING STUDIES OF CRYSTALS.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 20B.
AD-658 342 HC$3.00 MF$0.65

EVALUATION OF RIGHT-CYLINDER CONDUCTIVITY CELLS,
Army Nuclear Defense Lab Edgewood Arsenal Md
Ronald A. Sasse, Hermann J. Donnert, and Ronald I. Brandler. 28 Oct 66, 14p Rept no. NDL-SP-19
Availability: Published in Journal of Electroanalytical Chemistry and Interfacial Electrochemistry v14 p385-92 1967.

Descriptors: (*Electrolytic cells, Configuration), Electrolytes, Electrical conductance, Cylindrical bodies, Electrodes, Mathematical analysis.

A theoretical equation, deduced from known physical principles, is presented for the cell constant of a right-cylinder conductivity cell as a function of the electrode radii and the electrode-axes displacement. Experimental data are compared with theoretical results and found in good agreement. In particular, the effects of changes in electrode-axes displacement are discussed. It is shown that small deviations from the coaxial electrode arrangement do not induce significant variations in cell constant. (Author)
AD-658 343 Not available from CFSTI.

MOTION OF ELECTRONS IN LIQUID ARGON.
Revised ed.,
Chicago Univ Ill Inst for the Study of Metals
J. Lekner. 26 Jan 67, 10p
AFOSR-67-2165
Grant AF-AFOSR-781-67
Revision of manuscript submitted 25 Oct 66.
Availability: Published in The Physical Review v158 n1 p130-7 Jun 5 1967.

Descriptors: (*Liquefied gases, Transport properties), (*Argon, Transport properties), (*Electrons, Liquefied gases), Atomic orbitals, Potential scattering, Polarization, Electric fields, Phase studies, Statistical distributions, Dielectric properties.

The scattering of electrons moving through nonpolar liquids is discussed. The Hartree field of an atom is assumed not to change on passing from gas to liquid. The screening of the long-range polarization potential is given by a self-consistent local field, which is found in terms of the pair correlation function. A microscopic dielectric function follows as a byproduct. The overlap of atomic force fields in the liquid is handled by the use of an effective potential suggested by Cohen. Detailed calculations are made for electrons in liquid argon. The principal result is that the Ramsauer minimum no longer exists in the liquid. The drift velocity in a steady electric field is found from the solution of the Boltzmann equation given by Cohen and Lekner. Agreement between experiment and theory is good. (Author)
AD-658 353 Not available from CFSTI.

EXISTENCE OF ENTROPY AS A CONSEQUENCE OF ASYMPTOTIC STABILITY,
Melbourne Univ (Australia)
For primary bibliographic entry see Field 20M.
AD-658 354 Not available from CFSTI.

TABULATED VALUES OF EXPERIMENTALLY DETERMINED DIFFERENTIAL ENERGY AND ANGLE SPECTRA FOR 137 CS GAMMA RAYS IN WATER AND AIR,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
Mary Alberg, Harold Beck, and Keran O'Brien. Dec 66, 78p

Descriptors: (*Water, *Gamma rays), Interpolation, Tables, Penetration, Detectors, Separation, Integration, Air.

For abstract, see NSA 21 17.
HASL-187 HC$3.00 MF$0.65

SPECTROCHEMICAL DETERMINATION OF IMPURITIES IN TUNGSTEN,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
K-1683 HC$3.00 MF$0.65

THE PREPARATION OF 17 O ENRICHED WATER FROM ENRICHED NITRIC OXIDE GAS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 18.
LA-3698 HC$3.00 MF$0.65

STABLE GASEOUS ISOTOPE SEPARATION AND PURIFICATION OCTOBER-DECEMBER 1966.
Mound Lab., Miamisburg, Ohio.

For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 17.
MLM-1390 HC$3.00 MF$0.65

ANALYSIS OF REACTOR FUEL ELEMENT SOLUTIONS. I. SEPARATIONS AND PREPARATION OF SAMPLES FOR MASS SPECTROMETRY AND ALPHA SPECTROMETRY. II. MASS SPECTROMETRIC DETERMINATION OF URANIUM AND PLUTONIUM CONCENTRATION AND ISOTOPIC COMPOSITION. III. ALPHA SPECTROMETRIC DETERMINATION OF PLUTONIUM 238,
New Brunswick Lab. (AEC), N. J.
C. E. Pietri, A. W. Wenzel, and L. J. Jasper, Jr.
May 67, 44p

Descriptors: (*Reactor fuel elements, *Mass spectroscopy), (*Spectrum analyzers, Uranium compounds), (*Plutonium compounds, *Alpha particle spectroscopy), Separation, Preparation.

For abstract, see NSA 21 17.
NBL-238 HC$3.00 MF$0.65

REVISION OF THE NBS TABLES OF SPECTRAL-LINE INTENSITIES BELOW 2450A,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 20F.
NBS-Mono-32-Suppl HC$0.30 MF$0.65

THE DETERMINATION OF CADMIUM IN CADMIUM-TIN ALLOYS - AN OSCILLO-POLAROGRAPHIC METHOD.
European Atomic Energy Community, Geel (Belgium). Joint Nuclear Research Center.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-34159 HC$3.00 MF$0.65

ON COMPLEX CHEMISTRY AND POLAROGRAPHY OF "TECHNETIUM".
Zur Komplexchemie Und Polarographie des Technetiums
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Radiochemie.
K. Schwochau. Apr 67, 88p JUL-465-RC
in German

Descriptors: *Chemical analysis, *Polarography, *Rhenium, *Technetium, Analysis, Bibliography, Chemical, Coefficient, Complex, Crystal, Diffusion, Formation, Ion, Property, Spectrum, Structure.

For abstract, see STAR 05 20.
N67-34165 HC$3.00 MF$0.65

SPECTROPHOTOMETRIC ANALYSIS OF THIN ANTIMONY/ARSENIC ALLOY FILMS.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 20.
N67-34310 HC$3.00 MF$0.65

AN ASSESSMENT OF ATOMIC FLUORESCENCE SPECTROMETRY AS A METHOD OF TRACE ANALYSIS.
Atomic Weapons Research Establishment, Aldermaston (England).
G. I. Goodfellow. Jan 67, 23p AWRE-O-87/66

Descriptors: *Fluorescent emission, *Spectrometry, *Trace element, Alkali, Analysis, Atom, Cadmium, Copper, Element, Emission, Fluorescence, Interference, Irradiation, Monochromator, Radiation, Resonance, Sensitivity, Trace, Zinc.

For abstract, see STAR 05 20.
N67-34436 HC$3.00 MF$0.65

ATOM RECOMBINATION. PART I - HALOGON ATOMS. PART II - SINGLET MOLECULAR OXYGEN FINAL SCIENTIFIC REPORT, JAN. 1963 - APR. 1967.
British Columbia Univ., Vancouver. Dept. of Chemistry.
E. A. Ogryzlo. Apr 67, 33p AFOSR-67-1290, AD-653611
Contracts AF-AFOSR-158-63, AF-AFOSR-158-65

Descriptors: *Atomic recombination, *Halogen, *Oxygen recombination, Atom, Bromine, Chlorine, Energy, Excitation, Iodine, Kinetics, Level, Luminescence, Molecule, Oxygen, Reaction, Recombination, Single.

For abstract, see STAR 05 20.
N67-34572 HC$3.00 MF$0.65

THERMAL CONSTANTS OF COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii.
V. P. Glushko. 3 Feb 66, 32p
TT-67-62383
Trans. of Termicheskie Konstanty Veschestv (USSR), n1 p3-17 1965, PB-175 627.

Descriptors: (*Thermochemistry, Tables), Specific heat, Enthalpy, Entropy, Heat of reaction, Free energy, Vapor pressure, Transition temperature, Pressure, Dissociation, Phase studies, USSR.

The document is comprised of a translation of the introductory and explanatory material of the book Termicheskie Konstanty Veschestv, Issue 1 (PB-175 627). Much of the text is applicable to subsequent volumes in the series as well.
PB-175 626 HC$3.00 MF$0.65

TERMICHESKIE KONSTANTY VESCHESTV, ISSUE 1 (THERMAL CONSTANTS OF COMPOUNDS, ISSUE 1),
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchonoi i Tekhnicheskoi Informatsii.
V. P. Glushko. 1965, 144p

Descriptors: (*Thermochemistry, Tables), (*Oxygen compounds, Thermal properties), (*Hydrogen compounds, Thermal properties), (*Halogen compounds, Thermal properties), (*Helium group gases, Thermal properties), Deuterated compounds, Tritiated compounds, Fluorine compounds, Chlorine compounds, Bromine compounds, Iodine compounds, Astatine compounds, Neon, Argon, Krypton, Xenon, Radon, Specific heat, Enthalpy, Entropy, Heat of reaction, Free energy, Vapor pressure, Transition temperature, Pressure, Dissociation, phase studies, USSR.

Tables of thermodynamic constants are given for some 265 compounds comprised of the elements O, H, D, T, Cl, Br, I, At, He3, He, Ne, Ar, Kr, Xe, and Rn. Values are included, where available, for heat capacity; enthalpy; entropy; energy of dissociation; enthalpy and Gibbs free energy of dissociation; changes in enthalpy and entropy on polymorphic transformation, fusion, and boiling; vapor pressures at phase transitions; critical temperatures and pressures. The data are complete as of the literature published to the middle of 1963. The textual material is in Russian, but a translation is available as PB-175 626.
PB-175 627 HC$3.00 MF$0.65

TERMICHESKIE KONSTANTY VESCHESTV, ISSUE 2 (THERMAL CONSTANTS OF COMPOUNDS, ISSUE 2),
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchonoi i Tekhnicheskoi Informatsii.
V. P. Glushko. 1966, 93p
See also PB-175 627.

Descriptors: (*Thermochemistry, Tables), (*Sulfur compounds, Thermal properties), (*Selenium compounds, Thermal properties), (*Tellurium compounds, Thermal properties), (*Polonium compounds, Thermal properties), Specific heat, Enthalpy, Entropy, Heat of reaction, Free energy, Vapor pressure, Transition temperature, Pressure, Dissociation, Phase studies, USSR.

Table of thermodynamic constants are given for some 230 compounds containing the elements S, Se, Te, and Po. Values are included, where available, for heat capacity; enthalpy, energy of dissociation; enthalpy and Gibbs free energy of dissociation; changes in enthalpy and entropy on polymorphic transformation, fusion, and boiling; vapor pressures at phase transitions; critical temperatures and pressures. The data are complete as of the 1964 literature. The brief introductory text and table headings are in Russian, but most of the material is accessible to English-reading users with the aid of PB-175 626.
PB-175 628 HC$3.00 MF$0.65

STUDY OF THE CHEMICAL INTEGRITY OF RADIOISOTOPE CONTAINMENT MATERIALS IN LAUNCH ABORT ENVIRONMENTS. PHASE III. BEHAVIOR OF GRAPHITIC MATERIALS,
TRW Systems, Redondo Beach, Calif.
W. Gregson, Jr. Apr 67, 38p

Descriptors: (*Radioactive isotopes, Containment), (*Graphite, Environment), Flames, Chemical reactions, Hydrogen, Oxygen, Methane, Air, Interactions, Combustion.

For abstract, see NSA 21 18.
SC-CR-67-2595 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

CONTRACTED BASIS SET ANALYTIC SELF-CONSISTENT FIELD WAVE FUNCTIONS FOR TRANSITION METAL ATOMS,
California Univ., Livermore. Lawrence Radiation Lab.
A. M. Karo, F. McMurphy, and R. K. Nesbet. 17 May 67, 28p
Contract W-7405-eng-48

Descriptors: (*Wave functions, *Transition elements), *Hartree-Fock approximation, Optimization), Atomic orbitals.

For abstract, see NSA 21 17.
UCRL-50260 HC$3.00 MF$0.65

7E. Radio and Radiation Chemistry

FLUORESCENT ION INTERACTION.
Sperry Rand Research Center, Sudbury, Mass.
For primary bibliographic entry see Field 20E.
AD-440 481 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION.
Monsanto Research Corp., Everett, Mass. Boston Lab.
For primary bibliographic entry see Field 11G.
AD-463 014 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART I.
Monsanto Research Corp., Everett, Mass.
For primary bibliographic entry see Field 11G.
AD-463 041 HC$3.00

RESEARCH AND DEVELOPMENT OF CATHODOLUMINESCENT PHOSPHOR WITH HIGH-INTENSITY ULTRAVIOLET EMISSION.
National Cash Register Co Dayton Ohio Research Div
For primary bibliographic entry see Field 9A.
AD-657 589 HC$3.00 MF$0.65

IRRADIATION OF KCl CRYSTALS CONTAINING KSH.
Technical rept.,
University of Western Ontario London Dept of Chemistry
O. E. Facey, and P. W. M. Jacobs. Sep 67, 11p
Contract N00014-66-C-0142

Descriptors: (*Potassium compounds, *Radiation chemistry), (*Color centers, Radiation chemistry), Chlorides, Sulfides, Hydrides, Crystal lattices, X rays, Ultraviolet radiation, Photolysis, Excitation, Band spectrum, Radiation damage.
Identifiers: Potassium chloride, Potassium hydrosulfide.

When crystals of KCl containing KSH are irradiated with X-rays at room temperature a prominent U-band develops, thus confirming the reaction SH (-) to H (-) + S-i where H (-) denotes a hydride ion on a normal lattice site and S-i an interstitial S atom. Photolysis with u.v. light at 10K results in the above reaction and also in the reaction SH (-) to H-i + S (-). Thus excited SH (-)* ions can break up in either of two ways, neither of which requires much thermal energy. (Author)
AD-657 604 HC$3.00 MF$0.65

SURFACE EFFECTS IN THE PHOTODEGRADATION OF POLYMER FILMS.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 11C.
AD-657 608 HC$3.00 MF$0.65

NO + O CHEMILUMINESCENT REACTION USING ADIABATICALLY EXPANDED NITRIC OXIDE,
Aerochem Research Labs Inc Princeton N J
Arthur Fontijn, and Daniel E. Rosner. 19 Dec 66, 5p
AFOSR-67-1995
Contracts AF 49 (638)-1654, Nonr-3623 (00)
Availability: Published in Journal of Chemical Physics v46 n8 p3275-6 Apr 15 1967.

Descriptors: (*Nitrogen oxides, *Chemiluminescence), (*Oxygen, Photochemistry), Reaction kinetics, Upper atmosphere, Afterglows, Excitation.

A recently reported discrepancy in apparent rate constant for the chemiluminescent reaction NO + O to NO2 + photon hv is explained in terms of the clustering that must occur when nitric oxide undergoes adiabatic expansion prior to reaction (as in the case of real or simulated upper atmospheric chemical releases). These clusters allow the normal three body excitation step to be replaced by a two-body step for which the observed rate constant is shown to be quite reasonable. (Author)
AD-657 657 Not available from CFSTI.

CHEMICAL YIELD DETERMINATIONS IN RADIOCHEMISTRY,
Brookhaven National Lab., Upton, N. Y.
Elinor F. Norton. 1960, 95p

Descriptors: (*Radiochemistry, Separation), Instrumentation, Chemical analysis, Radioactivity, Laboratory equipment.

For abstract, see NSA 21 18.
NAS-NS-3111 HC$3.00 MF$0.65

STANDARD REFERENCE MATERIALS: MOSSBAUER SPECTROSCOPY STANDARD FOR THE CHEMICAL SHIFT OF IRON COMPOUNDS,
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
Jon J. Spijkerman, David K. Snediker, Fillmer C. Ruegg, and James R. DeVoe. 28 Jul 67, 57p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.40.

Descriptors: (*Iron compounds, *Mossbauer effect), (*Spectroscopy, Standards), Single crystals, Calibration, Gamma-ray spectra, Absorption spectrum, Sodium compounds, Ferrates, Cyanides.
Identifiers: Sodium nitroferricyanide.

The preparation, calibration, and use of the Standard Reference Material for chemical shift of iron compounds in Mossbauer Spectroscopy is described. This standard is a properly oriented single crystal of sodium pentacyanonitrosyl-ferrate (II) dihydrate (sodium nitroprusside). Primary standards were calibrated with a high accuracy optical Mossbauer spectrometer and secondary calibrations were made with a tandem Mossbauer spectrometer. The midpoint between the two absorption peaks in the spectrum at 25.0C provide a useful velocity scale calibration of the spectrometer. Descriptions of the spectrometers used and the error analysis associated with the data are given. Suggested format for reporting Mossbauer spectra and their parameters is is also presented. (Author)
NBS-MP-260-13 HC$0.40 MF$0.65

ANALYTICAL COORDINATION CHEMISTRY: TITRIMETRY, GRAVIMETRY, FLAME PHOTOMETRY, SPECTROMETRY, GAS EVOLUTION AND ISOTOPIC PREPARATIONS, JULY 1965 TO JUNE 1966.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7B.
NBS-TN-402 HC$0.50 MF$0.65

THE DETERMINATION OF STRONTIUM 90 IN ENVIRONMENT MATERIALS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
P. S. Davis, and N. R. Piper. Feb 67, 17p
AAEC/TM377

Descriptors: *Environmental testing, *Food, *Ion exchange, *Strontium 90, Analysis, Chromatography, Effluent, Fish, Method, Milk, Radioactivity, Rain, Sand, Soil, Vegetation, Water, Yttrium.

For abstract, see STAR 05 20.
N67-34081 HC$3.00 MF$0.65

THE EMISSION SPECTROCHEMICAL ANALYSIS OF IMPURITIES IN PLUTONIUM DIOXIDE.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
L. S. Dale, and H. J. Hurst. Feb 67, 18p AAEC/TM376

Descriptors: *Analytical chemistry, *Chromatography, *Impurity, *Plutonium oxide, *Spectrography, Adsorption, Analysis, Chemistry, Compound, Effluent, Emission, Graphite, Metal, Oxide, Spark, Spectrum.

For abstract, see STAR 05 20.
N67-34327 HC$3.00 MF$0.65

A COMPARISON OF TRI-N-OCTYLPHOSPHINE OXIDE AND TRI-N-OCTYLARSINE OXIDE AS EXTRACTION AGENT FOR TRIVALENT LANTHANIDES AND ACTINIDES.
Ein Vergleich Von Tri-n-octylphosphinoxid Und Tri-n-octylarsinoxid Als Extraktionsmittel Fuer Dreiwertige Lanthanide Und Actinide
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Physikalische Chemie.
A. J. Blair, and H. Michael. Dec 66, 30p JUL-434-PC
in German, English Summary

Descriptors: *Actinide, *Arsenic compound, *Lanthanide, *Phosphine, *Solvent extraction, Acid, Agent, Arsenic, Coefficient, Compound, Dependence, Effect, Extraction, Germany, Lanthanum, Lithium, Measurement, Mixture, Nitrate, Nitric, Oxide, Property, Solvent, Synergism, Trivalent.

For abstract, see STAR 05 20.
N67-34359 HC$3.00 MF$0.65

THE SEPARATION OF NEODYMIUM FOR THE DETERMINATION OF THE BURN-UP OF NUCLEAR FUELS.
United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-34383 HC$3.00 MF$0.65

PHOTOCHEMICAL INTERPRETATION OF INACTIVITY PHENOMENA IN CADMIUM SULFIDE.
Die Photochemische Deutung Traeger Erscheinungen in Kadmiumsulphid
Technische Hogeschool, Eindhoven (Netherlands).
E. Tscholl. 1967, 108p
in German

Descriptors: *Cadmium sulfide, *Crystal lattice, *Photochemical reaction, Bibliography, Cadmium, Crystal, Lattice, Model, Photochemistry, Physics, Reaction, Single, Solid, State, Sulfide, Temperature, Theory, Volumetric.

For abstract, see STAR 05 20.
N67-34599 HC$3.00 MF$0.65

DIFFUSION AND SURFACE REACTIONS OF SINGLET EXCITONS IN ANTHRACENE.
Technische Hogeschool, Eindhoven (Netherlands).
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 20.
N67-34836 HC$3.00 MF$0.65

STUDY OF A METHOD OF PREPARING COMPOUND LABELLED WITH P-32 OF HIGH SPECIFIC ACTIVITY, STARTING FROM "CARRIER- FREE P-32" FINAL REPORT.
Studio Di Un Metodo Di Preparazione Di Compositi Marcati Con 32p Ad Alta Attivita Specifica, Ottenuti A Partire Da 32p "carrier Free" Relazione Finale
Istituto Di Ricerche (G. Donegani), Novara (Italy).
M. Dubini, and G. C. Perucca. May 67, 26p
EUR-3453.I
Contract EURATOM-073-64-9 RISI
in Italian, English Summary

Descriptors: *Paper chromatography, *Phosphorus 32, *Trace element, Chemical reaction, Chromatography, Distillation, Element, Paper, Preparation, Radioactive isotope, Trace.

For abstract, see STAR 05 20.
N67-35261 HC$3.00 MF$0.65

ADSORPTION OF PROTACTINIUM ON UNFIRED VYCOR FINAL HOT-CELL EXPERIMENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7B.
For abstract, see NSA 21 17.
ORNL-3950 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

ON SOME COCOONS BELONGING TO UNDESCRIBED SPECIES OF ENDOPARASITIC TURBELLARIANS,
Copenhagen Univ Helsingoer (Denmark) Marine Biological Lab
For primary bibliographic entry see Field 6C.
AD-657 882 Not available from CFSTI.

RECOVERIES OF MARKED PINK SHRIMP, PENAEUS DUORARUM BURKENROAD, RELEASED ON THE FLORIDA TORTUGAS GROUNDS IN 1965,
Bureau of Commercial Fisheries, Galveston, Tex. Biological Lab.
Charles E. Knight, and Richard J. Berry. Aug 67, 83p Contrib-234
FWS-RD-19

Descriptors: (*Crustacea, Marine biology), Labels, Recovery, Collecting methods, Florida, Tables.

In the course of two studies on the Tortugas fishing grounds in 1965, Bureau of Commercial Fisheries personnel stain marked and released 18,804 pink shrimp. Of these, 7,106 were recaptured by the commercial fishing fleet. This report contains information on dates and locations of release and recaptures of shrimp, identification of vessels that caught marked shrimp, and data on sex, length, and weight of the shrimp recovered. (Author)
PB-175 710 HC$3.00 MF$0.65

8B. Cartography

REMOTE SENSING PAPERS AT THE AAAS - IMPACT AND IMPLICATIONS.
Technical rept.,
Florida Atlantic Univ Boca Raton Dept of Geography
James P. Latham. Jun 67, 25p Rept no. TR-2
Contract Nonr-4761 (00)
Availability: Presented in Section E Program, American Association for the Advancement of Science, Dec 29, 1962, Philadelphia, Pa.

Descriptors: (*Mapping, Sensors), Geography, Instrumentation, Pattern recognition, Scanning, Images, Photointerpretability.

Role of instrumentation in geographic research: Remote sensing of environment, and pattern analysis illustrate that geographers are exploiting devices that locate, measure, process, evaluate, and describe distributed aspects of environment. Machine systems are needed for rapid and rigorous evaluation of geographic relationships. Geographic training should be redesigned to familiarize students with instrumentation and to encourage geographers to become involved with the design and application of instruments. Geographic integration of imagery patterns: Photography detects varied aspects of the visual and near infrared spectrums. Electromagnetic devices revealed additional geographic patterns, and contribute imagery less restricted by weather or darkness. Imagery acquisition exceeds the integrating capabilities of present methods for interpretation and analysis. Scanners and computers can search multispectral images for pattern variations and consistencies, resulting from alternate sensor capabilities. Integrated data can produce maps which indicate the surface distributions of spatial relationships not revealed by one sensor but discernable from the integration. Resume of the special session on remote sensing held at the 1965 AAAS meeting: Invited panelists presented recent findings and a survey of the art in a 'Symposium on the Remote Sensing of Environment' at the 1965 Berkeley Meeting of the American Association for the Advancement of Science. Journalists attending the meeting provided unusual nationwide press reporting of the remote sensing capabilities. (Author)
AD-657 628 Not available from CFSTI.

8C. Dynamic Oceanography

COMPILATION OF REPRINTS.
Technical repts.
Oregon State Univ Corvallis Dept of Oceanography
1967, 44p Rept no. TR-91-94
Contracts Nonr-1286 (09), Nonr-1286 (10)
Availability: Published in Various Journals.

Descriptors: (*Oceanology, Reports), pH, Salinity, Gravity, Rivers, Geodesics, Water pollution, Carbon dioxide, Measurement, Pacific Ocean.

Contents: Surface pH of the northeastern Pacific ocean; Journal of the oceanological society of Korea; Note on Yoshida's (1954) theory of coastal upwelling; Gravity and structure of the eastern part of the mendocino escarpment; Journal of geophysical research; Predicted flushing times and pollution distribution in the Columbia river estuary. (Author)
AD-657 918 Not available from CFSTI.

OCEANIC ELECTRIC CURRENTS, GEOMAGNETIC VARIATIONS AND THE DEEP ELECTRICAL CONDUCTIVITY STRUCTURE OF THE OCEAN-CONTINENT TRANSITION OF CENTRAL CALIFORNIA,
Scripps Institution of Oceanography La Jolla Calif
For primary bibliographic entry see Field 8N.
AD-657 935 HC$3.00 MF$0.65

FLUCTUATING WINDS AND THE OCEAN CIRCULATION,
Massachusetts Inst of Tech Cambridge Dept of Mathematics
Joseph Pedlosky. 17 Jan 66, 9p
AFOSR-67-2118
Grant AF-AFOSR-492-66
Availability: Published in Tellus v19 n2 p250-7 1967.

Descriptors: (*Ocean models, Mathematical analysis), Boundary layer, Theory, Fluid dynamic properties, Equations, Functions, Wind, Motion.

The fluctuating and steady response of a simple bounded ocean model to a surface wind stress which oscillates at or near one of the Rossby wave resonance frequencies of the basin is computed under the assumption that the response is limited by finite amplitude effects. It is shown that oscillations of the normal modes can never rectify in a way to produce intense boundary currents, but that motions driven not at a resonance frequency are able to produce such steady boundary layers. (Author)
AD-658 266 Not available from CFSTI.

8D. Geochemistry

COPRECIPITATION OF ZINC WITH CALCIUM CARBONATE,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
James H. Crocket, and John W. Winchester. 8 Nov 65, 19p
Contract Nonr-1841 (74)
Availability: Published in Geochimica et Cosmochimica Acta v30 p1093-109 1966.

Descriptors: (*Carbonates, Chemical precipitation), (*Zinc, Chemical precipitation), (*Calcite, Geochemistry), Impurities, Minerals, Solid solutions, Complex compounds, Recrystallization, Calcium compounds.
Identifiers: Calcium carbonate.

The distribution of zinc between precipitates of calcium carbonate and saturated aqueous solution at low ionic strength was measured at 25, 35, and 50C. After two weeks of digestion at the precipitation temperature, the distribution at 50C was homogeneous, but at the lower temperatures logarithmic distributions were found. At 50C the partition coefficient D = 3.2 plus or minus 0.2, and, by comparing with the ratio of solubility product constants K (calcite)/K (smithsonite) = 34.0, we calculate the activity coefficient of ZnCO3 in dilute solid solution with CaCO3 to be gamma = 10.6 plus or minus 0.7. This quantity is relatively independent of temperature but is dependent on complex ion chemistry of the aqueous solution and may be revised if new complexes of Zn (II) or Ca (II) should be found. Recrystallization at 50C must be extensive to form homogeneous crystals, but at 35 and 25C recrystallization must be very much slower to preserve the logarithmic distribution, an observation consistent with previously reported observations on calcite-aragonite composition of precipitates. Many carbonates of trace elements are less soluble than calcite or aragonite, and these should be coprecipitated with calcium carbonate in nature. (Author)
AD-657 730 Not available from CFSTI.

NEUTRON SPECTROSCOPY WITH NUCLEAR EMUSLIONS,
Army Nuclear Defense Lab Edgewood Arsenal Md
Austin W. Barrows, and Richard V. Mancuso. Jul 67, 35p Rept no. NDL-TR-92

Descriptors: (*Nuclear spectroscopy, *Photographic emulsions), (*Neutron spectrum, Measurement), Photographic images, Microscopy, Carbon, Neutron reactions, Alpha particles, Particle trajectories.
Identifiers: Nuclear emulsions.

A method is described for measuring neutron energy spectra with nuclear emulsions. The normal concentration of hydrogen in the emulsion serves as the proton radiator. It is concluded that neutron groups separated by 400 keV or more and in the energy range of 2 to 15 MeV can be resolved. Preliminary results from the study of the C12 (n,n')3 alpha reaction using emulsions are also discussed. (Author)
AD-658 067 HC$3.00 MF$0.65

8E. Geodesy

DIRECT AND INVERSE SOLUTIONS OF GEODESICS.
Technical rept.,
Army Map Service Washington D C
Emanuel M. Sodano, and Thelma A. Robinson. Jul 63, 42p Rept no. TR-7-Rev

Descriptors: (*Geodesics, Mathematical analysis), Iterative methods, Accuracy, Power series, Numerical analysis, Tables.

This Technical Report supersedes TR No. 7 entitled: INVERSE COMPUTATION FOR LONG LINES: A NON-ITERATIVE METHOD BASED ON THE TRUE GEODESIC, which is out of print. It contains the material of the original publication of 1950, and in addition, formulas pertaining to long lines, derived through the years at AMS. The solutions of the Direct and Inverse Geodetic Problem are presented in forms which are adaptable to desk calculator and to electronic computer. The maximum errors in the solutions due to the omission of higher order terms have been determined and are presented in tables in the

Appendix. These tables will enable the user of the solutions to decide whether the accuracy requirements can be obtained with or without the higher order terms. These higher order terms have been derived and are presented herein. (Author)
AD-657 591 HC$3.00 MF$0.65

COMPILATION OF REPRINTS.
Oregon State Univ Corvallis Dept of Oceanography
For primary bibliographic entry see Field 8C.
AD-657 918 Not available from CFSTI.

8F. Geography

THE SPATIAL STRUCTURE OF A SELECTED INTERPERSONAL CONTACT: A REGIONAL COMPARISON OF MARRIAGE DISTANCES IN INDIA.
Northwestern Univ Evanston Ill Dept of Geography
For primary bibliographic entry see Field 5K.
AD-657 852 HC$3.00 MF$0.65

A HISTORICAL GEOGRAPHY OF THE SANTA MARTA AREA, COLOMBIA,
California Univ Berkeley Dept of Geography
James R. Krogzemis. 1967, 224p
Contract Nonr-3656 (03)

Descriptors: (*Geography, Colombia), History, Climatology, Archaeology, Terrain, Agriculture, Population, Rural areas, Economics, Aquatic animals, Forestry, Recreation, Industries, Mountains, Beaches, Environment, Rivers, Tables, Maps.

Contents: Prehistory and Spanish conquest; The lowlands and coast surrounding the Sierra Nevada de Santa Marta; The Cienaga Grande de Santa Marta; The highlands of the Sierra Nevada de Santa Marta; The indians of the Sierra Nevada.
AD-657 858 HC$3.00 MF$0.65

WEATHER PHENOMENA IN HAWAII. PART I. SYNOPTIC CLIMATOLOGY OF HAWAII. PART II. A PRELIMINARY STUDY OF THUNDERSTORMS IN HAWAII.
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 4B.
PB-175 801 HC$3.00 MF$0.65

8G. Geology and Mineralogy

GEOLOGIC AND ENGINEERING PROPERTIES INVESTIGATIONS.
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 18C.
AD-657 638 HC$3.00 MF$0.65

BERING LAND BRIDGE: EVIDENCE OF SPRUCE IN LATE-WISCONSIN TIMES.
Arctic Inst of North America Washington D C
For primary bibliographic entry see Field 6C.
AD-658 298 Not available from CFSTI.

PALEOCLIMATIC INTERPRETATIONS OF SOME MESOZOIC FLORAL SEQUENCES.
Revised ed.,
Arctic Inst of North America Washington D C
Charles J. Smiley. 16 Sep 66, 17p
Contract Nonr-3996 (01)
Prepared in cooperation with Idaho Univ., Moscow. Dept. of Geology and Geography. Revision of manuscript received 19 May 66.
Availability: Published in The American Association of Petroleum Geologists Bulletin v51 n6 pt-1/2 p849-63 Jun 1967.

Descriptors: (*Paleontology, *Plants (Botany)), Deposits, Climatology, Rivers, Aquatic animals, Stratigraphy, Deposition, Arctic regions, Maps, Tables, Alaska.

Studies of Cretaceous floral sequences in northern Alaska were conducted during five field seasons from 1956 to 1966. Seven study areas across more than 350 miles of the Arctic Slope were examined in considerable stratigraphic detail. Marine invertebrate index fossils collected from deposits interbedded or intertonguing with plant-bearing units permit references to European stages of the Cretaceous. Comparisons of local floral sequences permit regional correlations of non-marine deposits across northern Alaska. Vegetational changes noted through thousands of feet of section in the various study areas provide a basis for inferring regional climates and climatic trends. Marine faunal interties indicate a time span from middle Albian to probably Maestrichtian, about 45 to 50 million years. Comparisons with selected North American Mesozoic floras and floral sequences at high latitudes (about 70 deg N.) and at middle latitudes (about 40 deg N.), and with Jurassic and Cretaceous records of Eurasia, suggest that vegetational and inferred climatic zonations were latitudinal as at present. Evidence suggests that vegetational zones shifted northward from Early Jurassic to medial Cretaceous (Albian) time, indicating a warming trend, followed by cooler climates in later Mesozoic time. Comparisons with floral records from other areas of the Northern Hemisphere, and of inferred climatic changes, do not favor concepts of wandering poles, drifting continents, or change in axial inclination as causal factors of climatic change since at least the beginning of Jurassic time. (Author)
AD-658 301 Not available from CFSTI.

THE STRATIGRAPHY OF TJORNES, NORTHERN ICELAND, AND THE HISTORY OF THE BERING LAND BRIDGE,
Arctic Inst of North America Washington D C
Thorleifur Einarsson, David M. Hopkins, and Richard R. Doell. 1967, 15p
Contract Nonr-3996 (01)
Prepared in cooperation with University Research Inst., Reykjavik, and Geological Survey, Menlo Park, Calif.
Availability: Published in The Bering Land Bridge p313-25 1967.

Descriptors: (*Stratigraphy, Iceland), Sedimentary rock, History, Terrain, Bridges, Ferrites, Magnetic fields, Sedimentation, Volcanoes, Rock (Geology), Geologic age determination, Erosion, Paleontology, Geological survey.

Recent studies of the upper Pliocene and Pleistocene rock sequences of Iceland contribute to knowledge of the history of land bridges and sea passages in the Bering Sea area, and also cast light on several other aspects of the history of the Pleistocene Epoch. On the peninsula Tjornes in northern Iceland is well-exposed sequences of Pliocene and Pleistocene marine and nonmarine sedimentary rocks intercalated with basaltic lava flows and, in its higher part, with tillite layers recording at least ten glacial episodes. The principle time of opening of Bering Strait is recorded in the lowest sequence of sedimentary rocks, the Tjornes beds, by the sudden appearance of a host of boreal molluscan taxa of Pacific ancestry. The ten tillite strata higher in the sequence are separated by strata or erosion surfaces that record long nonglacial intervals, suggesting that the conventional sequence, established in North America and Europe, of only four or five Pleistocene glaciations, may be incomplete and that Pleistocene climatic history is much more complex than has been previously recognized. Tjornes lies at the northwestern edge of the Icelandic central graben, the most active locus of Quaternary volcanic activity in Iceland (Fig. 1, inset). Tjornes has been a restless, tectonically active area during the development of the graben. Repeated and still-active faulting has created a basin-and-range topography. Several small, short-lived basins have been formed and then filled with marine, fluviatile, lacustrine, and sometimes glacial deposits. (Author)
AD-658 306 Not available from CFSTI.

REFLECTION AND TRANSMISSION FROM A PLANE LAYERED CORE-MANTLE BOUNDARY,
California Inst of Tech Pasadena Div of Geological Sciences
For primary bibliographic entry see Field 8K.
AD-658 358 Not available from CFSTI.

A MICRO-EARTHQUAKE SURVEY OF THE SAN ANDREAS FAULT SYSTEM IN SOUTHERN CALIFORNIA,
California Inst of Tech Pasadena Div of Geological Sciences
For primary bibliographic entry see Field 8K.
AD-658 359 Not available from CFSTI.

SEISMIC EVIDENCE FOR A NEW LAYERED STRUCTURE OF THE EARTH'S CORE,
Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 8K.
AD-658 364 Not available from CFSTI.

ATTENUATION OF THE TORSIONAL FREE OSCILLATIONS IN AN EARTH WITH A DISSIPATIVE MANTLE AND A DISSIPATIVE SOFT-SOLID CORE OR A VISCOUS-LIQUID CORE.
Revised ed.,
Lamont Geological Observatory Palisades N Y
Ryosuke Sato. 30 Jan 67, 20p Rept no. Contrib-1042
AFOSR-67-2141
Grant AF-AFOSR-887-65
Revision of manuscript submitted 27 Apr 66.
Availability: Published in Journal of Geophysical Research v72 n12 p3207-24 Jun 15 1967.

Descriptors: (*Earth models, Oscillation), (*Stratigraphy, Theory), Attenuation, Viscosity, Liquids, Bessel functions, Asymptotic series, Tables.

The resonance periods and attenuation factors for the torsional free oscillations of the earth are determined for two cases, a soft-solid core with a dimensionless quality factor Qc and a viscous-liquid core with a viscosity vc. The earth model adopted for numerical computations is the Gutenberg IV model. The computations are carried out for the gravest modes with order numbers from 2 to 10. The period for a given n does not vary smoothly as the core rigidity is changed, so that it is not possible to determine the core rigidity from the period of the free oscillations unless the period is determined experimentally to an accuracy of less than several seconds. The relation between the quality factor Q (n) for the torsional free oscillation of the gravest mode oTn, and Qj and Qc is derived. It is shown that Q values in the lower mantle and Qc make an important contribution to Q (n) for lower-order numbers and make less contribution to Q (n) for higher-order numbers. A simple Q distribution is adopted for the mantle. Q (13) and Q (10) are estimated when Q (2) is assumed to be 150 (Qc approximately equals 350) and 200 (Qc approximately equals 490). Q (8) to Q (10) are of the order of 400 to 350 for this model, even for large Qc. The resonance periods for a given n for the viscous-liquid core are expressed in the form of a linear function of (vc)1/2. The relation between Q (n) and Qj and vc is also presented. By using the same Q distribution for the mantle as for the soft-solid core and the relation between the mean Q in the mantle and vc, it is possible to estimate Q values for the torsional oscillations. (Author)
AD-658 365 Not available from CFSTI.

PRELIMINARY RESULTS OF AN INVESTIGATION OF CRUSTAL STRUCTURE IN SOUTHEASTERN EUROPE,

National Observatory of Athens (Greece) Seismological Inst
For primary bibliographic entry see Field 8K.
AD-658 395 Not available from CFSTI.

THE PUERTO RICO TRENCH.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8J.
AD-658 402 Not available from CFSTI.

THE GEOLOGY OF THE WESTERN APPROACHES OF THE ENGLISH CHANNEL. V. THE CONTINENTAL MARGIN AND SHELF UNDER THE SOUTH CELTIC SEA.
Technical rept.,
Woods Hole Oceanographic Institution Mass
J. B. Hersey, and W. F. Whittard. Aug 67, 30p
Rept no. WHOI-Ref-67-49, WHOI-Contrib-1828
Contract Nonr-4029 (00), Grant NSF-GP-2370
Prepared in cooperation with Bristol Univ. (England).
Availability: Published in Internat. Upper Mantle Proj., Continental Margins and Island Arcs, Rept. Symposium, Ottawa, GSC Paper 66-15 p80-105 1966.

Descriptors: (*Structural geology, English Channel), Deposits, Stratigraphy, Reflection, Seismology, Ocean bottom topography, Faults (Geology), Sedimentary rock.

Upper Cretaceous and Tertiary deposits, mainly of shallow-water origin, form a broad, complex synclinal structure which trends east-northeast, closes eastwards, and occupies most of the central part of the Western Approaches of the English Channel west of longitude 3W. Important anticlines and synclines occur throughout this structural sedimentary trough as well as many minor flexures shown in seismic reflection profiles. Stratigraphic evidence indicates that, from Eocene to Plio-Pleistocene times, a gulf or channel extended eastwards towards the English Channel at least as far as longitude 5W. Seismic refraction and magnetometer results by the Cambridge group also indicate a complex trough which was traced to the shelf-break and which corresponds reasonably well with the trough deduced stratigraphically. Five crossings of the edge of the shelf all provide the same basic pattern, viz., strata gently inclined towards the continental slope by which they are sharply truncated. It is suggested that, subsequent to the formation of the continental margin, faulting has progressively fashioned and remodelled the slope up to near-Recent times and, furthermore, that the continental slope is receding faster than it is built out by modern sedimentation. (Author)
AD-658 405 Not available from CFSTI.

TRANSITIONAL TYPES OF CRUST UNDER SMALL OCEAN BASINS.
Revised ed.,
Scripps Institution of Oceanography La Jolla Calif
Inst of Marine Resources
H. W. Menard. 20 Feb 67, 14p
Contract Nonr-2216 (23), Grant NSF-GP-4235
Revision of manuscript submitted 7 Oct 66.
Availability: Published in Journal of Geophysical Research v72 n12 p3061-72 Jun 15 1967.

Descriptors: (*Oceans, *Structural geology), Thickness, Sedimentation, Velocity, Deposits, Sedimentary rock, Ocean bottom topography, Gravity, Black Sea, Mexico Gulf.

Small ocean basins, such as the Aleutian basin, Gulf of Mexico, and Black Sea, are underlain by crustal sections that are significantly different from normal continents or ocean basins. A common layer with oceanic crustal velocity has a wide range of thicknesses. A very thin layer with granitic velocity occurs in some places. Both are absent under a few basins where sediment rests on low-velocity mantle. These basins are the locus of intense sedimentation, and most are floored by abyssal plains underlain by many kilometers of sediment. The basins have only a small total area, but they contain about a sixth of all identifiable oceanic sediment. In some basins the thick sediment has been pierced by salt domes or possibly giant mud lumps. A common type of small basin has a normal oceanic layer overlain by thick sediment and possibly underlain by high-density mantle. Sediment in these basins will ultimately approach continental thickness unless deposition is interrupted. The basins have about 5% of the area of continents. They may mark regions of crustal transition from typical oceanic to typical continental crust. If so, such transitions may not be uncommon. Transitions from continental to oceanic crust are less evident. (Author)
AD-658 406 Not available from CFSTI.

THE ORINOCO DELTA.
Scripps Institution of Oceanography La Jolla Calif
For primary bibliographic entry see Field 8H.
AD-658 407 Not available from CFSTI.

CRUSTAL STRUCTURE OF THE MEDITERRANEAN SEA BY SURFACE WAVES. PART I. GROUP VELOCITY,
Observatorio Central Geofisico Toledo (Spain)
Gonzalo Payo. 20 Apr 66, 24p
AFOSR-67-2142
Contract AF 61 (052)-657
Published in Bulletin of the Seismological Society of America v57 n2 p151-72 Apr 1967.

Descriptors: (*Structural geology, Mediterranean Sea), (*Seismology, Mediterranean Sea), Rayleigh waves, Earthquakes, Thickness, Surface properties, Velocity, Seismological stations, Tables, Scattering.

The purpose of the paper is to obtain an approximation to the crust-mantle structure of the Mediterranean Region, using only group-velocity data. Earthquakes whose seismic paths cross totally or partially the Mediterranean Sea have been used. Forty-eight earthquakes have been selected and their corresponding Rayleigh and Love group-velocity dispersion curves were calculated. Most of the records belong to the standard seismological stations installed in the borders of the Mediterranean Sea. The Rayleigh and Love wave dispersion curves obtained have been classified in five different groups which show the same dispersive character. There is a correlation of such classification with the oceanic percentage and geographic region crossed by the paths, i.e., with the corresponding type of crustal structure. Crust-mantle theoretical models have been computed for both Rayleigh and Love waves. The Dispersion curves of these models fit acceptably into an average of the data of each group. They show a remarkable difference between the eastern and western Mediterranean crust, which is considered as one of the main results of this investigation. The crust to the south of the Ionian and Aegean Seas shows somewhat smaller velocities and larger thicknesses, for the uppermost crustal layers, than that of the western Mediterranean, which seems to be of a more oceanic character. (Author)
AD-658 409 Not available from CFSTI.

RESULTS FROM SEDAN POSTSHOT DRILLING,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
UCRL-50213 HC$3.00 MF$0.65

8H. Hydrology and Limnology

TURBELLARIA OF NORTHERN ALASKA AND NORTHWESTERN CANADA.
Arctic Inst of North America Washington D C
For primary bibliographic entry see Field 6C.
AD-658 300 Not available from CFSTI.

MICROBIOLOGICAL STUDIES OF AQUATIC HABITATS OF THE AREA OF INUVIK, NORTHWEST TERRITORIES.
Arctic Inst of North America Washington D C
For primary bibliographic entry see Field 6M.
AD-658 302 Not available from CFSTI.

MANAYUNKIA SPECIOSA LEIDY - A FRESHWATER POLYCHAETE FOUND IN NORTHERN ALASKA,
Arctic Inst of North America Washington D C
For primary bibliographic entry see Field 6C.
AD-658 304 Not available from CFSTI.

THE ORINOCO DELTA.
Revised ed.,
Scripps Institution of Oceanography La Jolla Calif
Tj. H. Van Andel. 18 May 66, 15p
Contract Nonr-2216 (23)
Revision of manuscript submitted 28 Oct 65.
Availability: Published in Journal of Sedimentary Petrology v37 n2 p297-310 Jun 1967.

Descriptors: (*Deltas, South America), (*Sedimentation, Deltas), Rivers, Drainage, Volume, Petrology, Maps, Ocean bottom topography, Reefs.

The Orinoco delta occupies a large re-entrant of the coast of northeastern South America between the Peninsula of Paria and the Guayana highlands. Offshore, it is partially sheltered by the island of Trinidad, while the southern part is fronted by a wide continental shelf. The coastal plain has been built entirely by the Orinoco, whereas the northern part has been constructed mainly by small lateral rivers descending from higher ground in the west and was invaded only recently by Orinoco distributaries. River levee systems are developed only in the apex of the delta; a wide outer zone of swamps and marshes with local chenier systems has been formed over the entire width of the delta front, largely by rapid coastal accretion. The sediments forming the delta are supplied only in part by the Orinoco; a large volume of sediment is contributed by longshore transportation from the east, probably from the Amazon River. The shape and structure of the modern delta are the result of the interaction, on a shallow sheltered shelf, of a large, dominantly fine-grained sediment supply with strong currents producing lateral redistribution. Comparison of the Orinoco delta with the deltas of the Mississippi, Rhone, and Niger Rivers shows that the facies distributions of the four deltas are fundamentally different, but can be viewed as responses to relative variations in the texture and rate of sediment supply, and in the intensity and direction of marine sorting and dispersal. (Author)
AD-658 407 Not available from CFSTI.

DISTRIBUTION OF COBALT 60, ZINC 65, STRONTIUM 85, AND CESIUM 137 IN A FRESHWATER POND,
National Center for Radiological Health, Rockville, Md.
For primary bibliographic entry see Field 6R.
PB-175 707 HC$3.00 MF$0.65

STATISTICAL THEORY OF EXTREME VALUES AND SOME PRACTICAL APPLICATIONS. A SERIES OF LECTURES.
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
For primary bibliographic entry see Field 12A.
PB-175 818 HC$3.00 MF$0.65

8J. Physical Oceanography

OCEAN WATER SENSING SYSTEM,
General Electric Co., Bridgeport, Conn. Wire and Cable Dept.

S. Zysk, and T. E. Borg. Dec 65, 27p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1-3 Dec 65. Prepared in cooperation with General Electric Co., Syracuse, N. Y., Heavy Military Electtronics Dept.

Descriptors: (*Oceanographic equipment, *Electric cables), (*Sensors, Temperature), Design, Buoys, Sea water, Anchors (Marine), Underwater equipment, Instrumentation, Calibration, Circuits, Thermistors, Pressure, Thermal insulation, Voltage, Stresses, Conductivity, Stainless steel.

Working with the National Bureau of Standards, the General Electric Company designed and manufactured a cable unit in which the temperature and pressure sensors became an integral link in the anchor system of the buoy. The unique feature of this cable is that all sensors are within the cable, and the cable has a uniform diameter throughout its length. The design and method of construction assured ease of handling of the cable and ease of payout when launched during placement of the buoy. The system was adjusted and calibrated so that it could be monitored by the readout equipment automatically. (Author)
AD-479 577 HC$3.00 MF$0.65

INDIAN OCEAN ATLAS. INTERPOLATED VALUES OF DEPTH, SALINITY, AND TEMPERATURE ON SELECTED SIGMA-T SURFACES.
National Oceanographic Data Center Washington D C
1967, 67p Rept no. NODC-Pub-G-12
Availability: Hard copy available from Naval Oceanographic Office, Washington, D. C. 20390 $2.00.

Descriptors: (*Indian Ocean, *Oceanographic data), Temperature, Salinity, Depth finding, Maps, Tables.

All pre-1959 Indian Ocean station data which were considered to be 'oceanographically plausible' are included. Approximately 250 IIOE stations, which were in the data file when the atlas was begun, are included in this publication. The charts present interpolated values on six sigma-t surfaces, beginning with 26.6 and ending with 27.6. The levels are spaced at increments of 0.2 sigma-t. For each sigma-t surface, a chart is included showing (1) the number of stations in each one-degree rectangle of the Indian Ocean area; (2) mean depth; (3) mean salinity; and (4) mean temperature. For each sigma-t surface, a table is used to show the range of depth, salinity, and temperature values for each one-degree rectangle containing two or more values. (Author)
AD-657 679 Not available from CFSTI.

SEA-SURFACE TEMPERATURE ESTIMATION,
Navy Electronics Lab San Diego Calif
E. R. Anderson. 9 Mar 67, 87p Rept no. NEL-1427
See also AD-648 849.

Descriptors: (*Oceans, *Surface temperatures), Environmental tests, Underwater sound, Detection, Periodic variations, Mathematical analysis, Computers, Atlantic Ocean, Pacific Ocean.

A regression model considering latitude, longitude, and day-of-year as the independent variables proves capable of estimating the seasonal variation of sea-surface temperature off the west coast of the United States to a standard deviation of less than 1F. Time/space interpolation promises to increase the yield of information from a given number of observations. Applications are seen in data editing and summarizing of archived information. (Author)
AD-657 842 HC$3.00 MF$0.65

COMPILATION OF REPRINTS.
Oregon State Univ Corvallis Dept of Oceanography
For primary bibliographic entry see Field 8C.
AD-657 918 Not available from CFSTI.

OCEANOGRAPHIC ATLAS OF THE NORTH ATLANTIC OCEAN. SECTION II. PHYSICAL PROPERTIES.
Naval Oceanographic Office Washington D C
1967, 309p Rept no. NOO-Pub-700-Sect-2
See also AD-625 861.
Availability: Hard copy available from U.S. Naval Oceanographic Office, Washington, D. C. $4.00.

Descriptors: (*Oceanographic data, Atlantic Ocean), (*Maps, Atlantic Ocean), Physical properties, Temperature, Salinity, Ice, Density, Underwater sound, Periodic variations, Velocity.

Section II, Physical properties is the fourth section of publication No. 700, 'Oceanographic Atlas of the North Atlantic Ocean,' published by the U. S. Naval Oceanographic Office. In this section each typical trace represents the temperature, salinity or density structure most frequently observed in the 610 meters (2,000 feet) of each region. The trace lies within an envelop encompassing all observations of temperature, salinity or density in the region. (Author)
AD-658 219 HC$4.00

THE PUERTO RICO TRENCH.
Technical rept.,
Woods Hole Oceanographic Institution Mass
Elizabeth T. Bunce. Aug 67, 14p Rept no. WHOI-Ref-67-46, WHOI-Contrib-1718
Contract Nonr-1367 (00), Grant NSF-GP-822
Availability: Published in Internat. Upper Mantle Proj., Continental Margins and Island Arcs, Rept. Symposium, Ottawa, GSC Paper 66-15 p165-75 1966.

Descriptors: (*Ocean bottom topography, Puerto Rico), Gravity, Seismology, Refraction, Bathythermograph data, Reflection, Ocean bottom, Structural geology, Velocity, Sedimentary rock, Marine geophysics, Sedimentation.
Identifiers: Trenches.

The results of recent marine geophysical investigations have been integrated with those of several earlier studies in an effort to define the structure of the Puerto Rico Trench. The observations include seismic refraction and continuous seismic reflection profiles, measurements of gravity, and bathymetry. The floor of the trench is an abyssal plain elongate east-west, 8.3 kilometres deep (depth corrected for velocity of sound), and sloping gently to the south. The shallow sedimentary layers of the sea floor revealed by short-pulse echo sounding are uniform across the axis but thicken towards the western end. The deeper sedimentary layers both tilt and thicken to the south. A continuous reflection profile approximately along the axis of the trench shows between 1.5 and 2.0 kilometres of layered sediments overlying a rough basement surface. North and south of the plain, the basement rises to form the bounding slopes. The crustal structure section shows a difference between the compressional wave velocities of material underlying the trench and of that underlying the outer ridge. Much of the seismic activity of the area is located beneath the south slope and occurs as shallow-focus earthquakes. The minimum free-air gravity anomaly lies south of the axis of the trench, toward the south slope. The trench may be a down-faulted or downwarped structure with activity continuing along the southern margin. An acoustically transparent sediment layer beneath the bottom reflection can be traced in places continuously down the north slope and beneath the upper section of abyssal plain sediments. (Author)
AD-658 402 Not available from CFSTI.

GRAVITY OVER TRENCHES AND RIFTS.
Technical rept.,
Woods Hole Oceanographic Institution Mass
Carl Bowin. Aug 67, 13p Rept no. WHOI-Ref-67-48, WHOI-Contrib-1730
Contract Nonr-4029 (00), Grant NSF-GP-822
Availability: Published in Internat. Upper Mantle Proj., Continental Margins and Island Arcs, Rept. Symposium, Ottawa, GSC Paper 66-15 p430-1966.

Descriptors: (*Gravity, *Ocean bottom topography), Ocean bottom, Convection (Atmospheric), Erosion, Anomalies, Tables, Oceans.
Identifiers: Trenches.

Mid-ocean ridges and the deep trenches are the most prominent features of the ocean basins, and both have been explained by investigators as resulting from convection in the mantle. Some aspects of these interpretations are examined. The ridges are in nearly isostatic equilibrium (free-air anomaly values are generally less than 50 mgal), but the trenches have very large negative free-air anomaly values and are considerably out of isostatic equilibrium. The Puerto Rico Trench has the largest free-air anomaly so far measured on the earth's surface (-380 mgal). A comparison of the Gulf of Aqaba, the East African Rifts, the Red Sea, the Gulf of California, and the Cayman Trough is made. Assuming a tensional origin for these features, it is concluded that between 40 and 100 kilometres of separation appear to be necessary before dense substratum begins to rise upward beneath the trough or rift. (Author)
AD-658 403 Not available from CFSTI.

THE GEOLOGY OF THE WESTERN APPROACHES OF THE ENGLISH CHANNEL. V. THE CONTINENTAL MARGIN AND SHELF UNDER THE SOUTH CELTIC SEA.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8G.
AD-658 405 Not available from CFSTI.

8K. Seismology

THE PROPAGATION OF ULTRASONIC ELASTIC WAVES IN SOLID BODIES AND IN GRANULAR MEDIA.
Oklahoma Univ. Research Inst., Norman.
For primary bibliographic entry see Field 20N.
AD-430 191 HC$3.00

COLLECTION AND ANALYSIS OF SEISMIC WAVE PROPAGATION DATA.
Annual rept.,
Michigan Univ Ann Arbor Inst of Science and Technology
David E. Willis, and Philip L. Jackson. Aug 67, 49p Rept no. 8071-6-P
Contract AF 49 (638)-1759, ARPA Order-292

Descriptors: (*Seismic waves, Propagation), Data Analysis, Scattering, Attenuation, Earthquakes, Nuclear explosions, Underground explosions, Seismometers, Background, Microseisms, Perturbation theory, Seismology.
Identifiers: LASA.

The report summarizes one year of theoretical and applied research on propagation of seismic waves and techniques for analyzing data. The main objectives were to determine the frequency and energy of seismic signatures, and investigate attenuation, patterns of azimuthal radiation from source regions, and methods of determining the type of motion at the source. Natural and artificial sources were studied to develop diagnostic aids for distinguishing between earthquakes and underground nuclear detonations. Equipment for selection, reformatting, and digital-to-analog conversion for digitally recorded LASA data was constructed and is being checked out. Several approaches for using the parallel computational capabilities of optics for LASA data were developed. A study of background noise and reciprocity for teleseismic

events as recorded on the bottom of a large fresh water lake has commenced with the emplacement of three-component seismometers in Lake Superior. Array data have been used for crustal studies on the Eastern United States. Digital mode filtering was investigated. A perturbation theory for seismic sources was developed. (Author)
AD-657 802 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE USE OF LONG-AND INTERMEDIATE-PERIOD SEISMIC WAVES FOR THE IDENTIFICATION OF SEISMIC SOURCES.
Annual technical rept.,
Lamont Geological Observatory Palisades N Y
Maurice Ewing. 15 Aug 67, 26p Rept no. 3
Contract AF 19 (628)-4082, ARPA Order-292

Descriptors: (*Seismic waves, Seismology), Nuclear explosions, Earthquakes, Microseisms, Excitation, Shock waves, Instrumentation, Seismometers, Computers, Data processing systems.
Identifiers: VELA-UNIFORM.

Seismological research supported by Air Force contract AF19 (628)-4082 at the Lamont Geological Observatory is summarized for the period 1 August 1966 to 1 August 1967. Several studies of interest to the VELA-UNIFORM program have been completed or carried out during this period. Among these, the study of the relative excitation of body and surface waves by explosions and earthquakes shows that while the two classes of events do not separate into two distinct categories, the explosions generate smaller surface waves than most of the explosions. Further studies of more nuclear explosions and earthquakes for PcP have confirmed the existence of an amplitude minimum near 32.5. Focal mechanism and aftershock studies have cast new light on our knowledge of the earthquake process and seismicity studies, made possible only by the availability of digital data, may enlarge our ideas on the spatial and temporal distribution of seismic sources. A large amount of work in the analysis of LASA data has been carried out during the three months that this work has been funded. Numerous programs have been written to facilitate the data handling problem and studies of the microseism characteristics and the propagation of the waves from the U.S.S.R. event of October 27, 1966 have been initiated. (Author)
AD-657 803 HC$3.00 MF$0.65

INVESTIGATIONS ON THE NONELASTIC BEHAVIOR OF THE UPPER MANTLE.
Quarterly narrative progress rept. no. 6, 1 Nov 66-31 Jan 67,
Technische Hochschule Karlsruhe (West Germany) Geophysikalisches Institut
Stephan Mueller, and Karl Fuchs. 20 Feb 67, 30p
AFOSR-67-2077
Contract AF 61 (052)-861, ARPA Order-612-1
See also AD-641 312.

Descriptors: (*Seismic waves, Scientific research), Elasticity, Lithosphere, Mathematical analysis, West Germany, Underground explosions, Reflection, Models (Simulations), Europe.
Identifiers: Mantle (Geology).

The spectrum of seismic body phases radiated from sources within the earth's crust is distorted by multiple reflections in the crustal layers. To estimate the crustal distortion crustal transfer functions for P-waves have been computed for sources having a simple radiation pattern in the infinite medium: the buried explosive point source standing for an underground explosion, and the vertical point source acting at the free surface of the crust and standing for an atmospheric explosion. The crustal model is taken from Finland. Radiation patterns have been computed for P-waves in the frequency range from 0 to 0.5 cps. An attempt has been made to separate the effect of the free surface from that of the layered crust in case of the explosive source. The latter effect starts to be noticeable at frequencies above 0.3 cps. Using the model for the upper mantle model in Europe (Lehmann, 1959) the radiation patterns have been transformed into amplitude-distance functions. Implications for the interpretation of experimental amplitude-distance curves of P-waves are discussed. (Author)
AD-658 047 HC$3.00 MF$0.65

A STUDY OF THE SEISMICITY OF THE CINCINNATI ARCH.
Final rept.,
Xavier Univ Cincinnati Ohio Seismological Observatory
Edward A. Bradley, and Robert B. Herrmann. 28 Jul 67, 65p
AFOSR-67-2062
Grant AF-AFOSR-677-64

Descriptors: (*Seismology, Seismic waves), Earthquakes, Seismological stations, Explosions, Velocity, Epicenter, Seismographs, Rayleigh waves, Ohio, Kentucky, Indiana, Tables.

The objectives are: Study of propagation characteristics of surface waves from blasts, and from their dispersion obtain a theoretical crustal structure. A study of local crustal velocities by obtaining portable and fixed station records of accurately timed quarry and strip mine blasts. The final report discusses these objectives. (Author)
AD-658 051 HC$3.00 MF$0.65

TECTONIC FEATURES OF THE EARTH'S CRUST AND UPPER MANTLE.
Pittsburgh Univ Pa Dept of Earth and Planetary Sciences
For primary bibliographic entry see Field 20N.
AD-658 053 HC$3.00 MF$0.65

LASA'S INSENSITIVITY TO EVENTS OCCURRING IN THE SANTA CRUZ - NEW HEBRIDES ISLANDS REGION,
Philco-Ford Corp Billings Mont Education and Technical Services Div
R. E. Needham. 7 Jun 67, 7p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, Sensitivity), (*Seismology, Pacific Ocean Islands), Detection, Signals, Tables, Statistical data.
Identifiers: LASA.

It has been observed that many events originating from the Santa Cruz-New Hebrides Islands Region are not being detected by the LASA system. Evaluation of this phenomena was conducted on sample events from the following regions: Santa Cruz Islands, Fiji Islands, Tonga Islands, Samoa Islands, Loyalty Islands, New Hebrides Islands, Solomon Islands, Mariana Islands. The statistics for these regions are shown. (Author)
AD-658 176 HC$3.00 MF$0.65

EVALUATION REPORT OF MANDREL INDUSTRIES MODEL EV-21V VERTICAL SEISMOMETER, SERIAL NO. 101 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
M. J. Lemelin. 9 Jun 67, 7p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, *Calibration), Specifications, Installation, Seismographs, Frequency, Response, Test methods, Tables.
Identifiers: LASA.

The report contains the laboratory evaluation of Mandrel industries Seismometer, Model EV-21V. Installation, field testing, and operating conditions are given. (Author)
AD-658 178 HC$3.00 MF$0.65

EVALUATION REPORT OF TELEDYNE MODEL TD-202 TRI-AXIAL SEISMOMETER, SERIAL NO. P-1 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
M. J. Lemelin. 6 Jun 67, 11p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, *Calibration), Specifications, Installation, Seismographs, Frequency, Response, Test methods, Tables.
Identifiers: LASA.

The report contains the laboratory evaluation of the Teledyne Industries Inc Triaxial Seismometer, Model TD-202. Installation, field testing, and operating conditions are given. (Author)
AD-658 179 HC$3.00 MF$0.65

EVALUATION REPORT OF GEOTECH MODEL 20171A VERTICAL SEISMOMETER, SERIAL NO. 706 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
M. J. Lemelin. 22 May 67, 9p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, Performance (Engineering)), Tests, Data.

Test data is presented for the lab test, installation test and field tests.
AD-658 181 HC$3.00 MF$0.65

SEISMOMETER EVALUATION PROCEDURE SHORT PERIOD VERTICAL SEISMOMETER (LASA-SP APPLICATION) LMC-P1,
Philco-Ford Corp Billings Mont Education and Technical Services Div
M. J. Lemelin. 9 May 67, 25p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, *Calibration), Calibration, Test methods, Installation, Seismographs, Frequency, Response, Test equipment (Electronics), Tables.
Identifiers: LASA.

The manual contains procedures for calibrating and measuring certain parameters of short period seismometers, viz. 0.2 sec to 5 sec period, and for the long term evaluation of seismograph response. Calibration and evaluation is carried out in three phases: Preliminary Checkout, Field Calibration/System Checkout, and Long Term Evaluation. Preliminary seismometer checkout occurs at the LMC and consists of measuring all significant parameters. After preliminary testing is complete, the seismometer is transported to the field for system checkout and redetermination of certain parameters. Finally, an evaluation program is conducted to collect the seismometer performance data while operating in the Montana LASA environment. (Author)
AD-658 182 HC$3.00 MF$0.65

EVALUATION REPORT OF MARK PRODUCTS MODEL L-3A VERTICAL SEISMOMETER, SERIAL NO. 101 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div

M. J. Lemelin. 25 May 67, 6p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, *Calibration), Specifications, Installation, Seismographs, Frequency, Response, Test equipment (Electronics), Tables.
Identifiers: LASA.

The report contains the laboratory evaluation of the Mark products seismometer, Model L-3A. Installation, field testing, and operating conditions are given. (Author)
AD-658 183 HC$3.00 MF$0.65

EVALUATION REPORT OF GEOTECH MODEL 20171A VERTICAL SEISMOMETER, SERIAL NO. 705 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
M. J. Lemelin. 22 May 67, 9p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Seismometers, *Calibration), Instruction manuals, Test methods, Installation, Seismographs, Frequency, Response, Test equipment (Electronics), Maintenance, Tables.
Identifiers: LASA.

The report contains the laboratory evaluation of the Geotech seismograph model 20171/25220. Installation, field testing, and operating conditions are given. (Author)
AD-658 184 HC$3.00 MF$0.65

THE TRAVEL TIMES OF P WAVES TO 30 DEGREES IN THE CENTRAL UNITED STATES AND UPPER MANTLE STRUCTURE.
Final scientific rept.,
Southwest Center for Advanced Studies Dallas Tex Geosciences Div
R. W. E. Green , and A. L. Hales. 31 Jul 67, 105p Rept no. Contrib-55
AFOSR-67-1664
Contract AF 49 (638)-1746
Rept. on Travel Times from Lake Superior Shots, 1966.

Descriptors: (*Seismology, Nuclear explosions), Refraction, Seismological stations, Detonations, Stratigraphy, Velocity, Anomalies, Time, Mathematical analysis, Geological survey, Telemetering data, United States.

The paper describes observations of the travel times from a series of 5-ton shots fired by the United States Geological Survey in Lake Superior during July 1966 (Project Early Rise). The observations were made along three profiles: the Wichita profile, extending 2250 km from Lake Superior to the Texas-Mexico border, the Little Rock profile, extending 1650 km from Lake Superior to the Arkansas-Louisiana border and an arc profile at a radius of about 1200 km from the shot point from West Virginia to the Kansas-Nebraska border. These records and others of the nuclear explosion GREELEY at points in the central United States, taken in conjunction with the times for GNOME, have been analyzed and model calculations made. (Author)
AD-658 198 HC$3.00 MF$0.65

PRELIMINARY STUDY OF THE AFTERSHOCKS IN THE CENTRAL ANDES,
San Calixto Observatory La Paz (Bolivia)
Ramon Cabre. 1967, 17p Rept no. Scientific-1
AFOSR-67-2070
Grant AF-AFOSR-792-65, ARPA Order-612

Descriptors: (*Earthquakes, South America), (*Mountains, South America), Periodic variations, Seismic waves, Microseisms, Seismological stations, Mathematical analysis, Measurement.
Identifiers: Vela-uniform.

The aftershocks located in the Central Andes between January 1950 and June 1963 are considered. It appears that data in that period were too scarce to obtain a number of locations sufficient to give satisfactory results by this method; this region has more earthquakes deeper than normal, which prevents a fuller use of the method; nevertheless it may give acceptable results if applied to the last years. (Author)
AD-658 205 HC$3.00 MF$0.65

EVALUATION OF SEISMIC INSTRUMENTS AND BASIC RESEARCH ON SEISMIC WAVE PROPAGATION.
Annual rept. no. 1, Jun 66-May 67,
Boston Coll Chestnut Hill Mass
Joseph I. Blaney, and John F. Devane. 30 Jun 67, 74p
AFCRL-67-0447
Contract AF 19 (628)-6067, ARPA Order-292
See also AD-637 941.

Descriptors: (*Seismology, Instrumentation), (*Seismic waves, Propagation), Transmitter-receivers, Portable, Seismometers, Computers, Signals, Calibration, Data processing systems, Costs.

The report contains a complete description of a Portable FM Seismic Transmitting and Receiving System capable of unattended operation. It is specifically designed to broaden the capabilities of the portable seismic system developed under Contract AF19 (628)-212. Each seismometer signal is preamplified and conditioned for FM transmission. The receiver recovers the signal and conditions it for recording, either directly or on magnetic tape. A computer controlled system for the calibration of seismometers is described. The end product is a response curve in terms of both amplitude and phase. (Author)
AD-658 206 HC$3.00 MF$0.65

P-WAVE VELOCITIES IN THE MANTLE BELOW 700 KM,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
Michael A. Chinnery, and M. Nafi Toksoz. 1 Aug 66, 30p
AFOSR-2092
Contract AF 49 (638)-1632
Availability: Published in Bulletin of the Seismological Society of America v57 n2 p199-226 Apr 1967.

Descriptors: (*Seismic waves, Velocity), Montana, Aleutian Islands, Seismological stations, Nuclear explosions, Models (Simulations).
Identifiers: Mantle (Geology), LASA, LONGSHOT.

Measurements of the slope of the travel-time curve have been made on a group of 167 events in the distance range 27 deg.-90 deg. along an azimuth of 300 deg-320 deg. from the LASA array in Montana. A first-order correction of +0.05 seconds/degree has been applied to the raw data to make them consistent with the travel-time residuals observed from the LONGSHOT nuclear test in the Aleutian Islands. The agreement between these two sets of data is sufficiently good that other station corrections at the array are assumed to be negligible. The resulting graph of dT/d delta against delta is shown to be consistent with other travel-time and amplitude observations. Using an assumed crust and upper mantle structure, a velocity-depth model for the mantle has been found which agrees, within the scatter of the data, with both the dT/d delta observations and the LONGSHOT residuals. This model shows three anomalous regions within the mantle, at depths of about 800, 1300, and 2000 km, where the velocity changes very slowly with depth. In each case the possibility that the velocity decreases with depth exists, but is not proven by the present data. (Author)
AD-658 257 Not available from CFSTI.

EARTH'S VISCOSITY,
California Inst of Tech Pasadena Seismological Lab
Don L. Anderson. 15 Sep 65, 4p
AFOSR-67-2083
Contract AF 49 (638)-1337
Availability: Published in Science v151 n3708 p321-2 Jan 21 1966.

Descriptors: (*Earth (Planet), Viscosity), (*Seismology, *Seismic waves), Rotation, Measurement, Oscillation, Elasticity, Glaciers, Temperature, Pressure.

Seismic methods are now being used to determine not only Earth's elastic properties, but also by how much it departs from a perfectly elastic body. The seismic anelasticity (Q) varies by several orders of magnitude throughout the mantle, the main feature an extremely dissipative zone in the upper mantle above 400 km. Recent determinations of viscosity by McConnell show a similar trend. The two sets of data indicate that the ratio of viscosity to Q is roughly a constant, at least in the upper mantle of Earth. On the assumption that this relation is valid for the rest of Earth, viscosities are estimated in regions that are inaccessible for direct measurement. The implied presence of a low-viscosity zone in the upper mantle, overlying a more viscous, less deformable, lower mantle, reconciles viscosities calculated from the shape of Earth and from postglacial uplift. The mismatch of the deformational characteristics at various levels in Earth, coupled with the changing rate of rotation, may be pertinent to the rate of release of seismic energy as a function of depth. (Author)
AD-658 268 Not available from CFSTI.

SPECTRUM OF SHORT-PERIOD CORE PHASES IN RELATION TO THE ATTENUATION IN THE MANTLE,
California Inst of Tech Pasadena Div of Geological Sciences
Hiroo Kanamori. 22 Sep 66, 8p Rept no. Contrib-1418
AFOSR-67-2084
Contract AF 49 (638)-1337
Availability: Published in Journal of Geophysical Research v72 n8 p2181-6 Apr 15 1967.

Descriptors: (*Seismic waves, Attenuation), Mechanical waves, Arizona, Earthquakes, Lithosphere, Mathematical analysis.
Identifiers: Mantle (Geology).

Spectral analysis is made of the records of the short-period reflected core phases from array stations at Tonto Forest, Arizona. Three earthquakes having delta = 32.5, 49.0, and 62.8 degrees are studied. Spectral ratios of ScS to ScP and PcS to PcP are calculated in order to estimate the differential effect of attenuation on P and S waves. The possible maximum value of average Q for shear in the mantle, Q beta, is about 324 for the period range 1.5 to 5 sec. Using the value of Q alpha, average Q for P waves, that was previously estimated as 435 through the spectral analysis of PcP phase Q beta and Q alpha/Q beta can be estimated at 230 and 1.90, respectively. (Author)
AD-658 269 Not available from CFSTI.

STUDY OF THE ENERGY OF THE FREE OSCILLATIONS OF THE EARTH,
California Inst of Tech Pasadena Div of Geological Sciences
Robert L. Kovach, and Don L. Anderson. 16 Sep 66, 17p Rept no. Contrib-1379
AFOSR-67-2108
Contract AF 49 (638)-1337
Prepared in cooperation with Stanford Univ., Calif. Dept. of Geophysics.
Availability: Published in Journal of Geophysical Research v72 n8 p2155-68 Apr 15 1967.

Descriptors: (*Earthquakes, Energy), Alaska, Gravity, Earth models, Oscillation, Dynamics, Resonant frequency, Compressive properties, Shear stresses.
Identifiers: Mantle (Geology).

The energies of the radial, torsional, and spheroidal free oscillations for a Gutenberg model earth were studied. Each mode of oscillation has a characteristic radial distribution of elastic and kinetic energy that fixes the parts of the earth that contribute most heavily in determining a particular resonant frequency. An examination of the partitioning of energy among compressional, shear, and gravitational energy as a function of mode number and depth immediately explains the persistence of the purely radial mode compared with the other normal modes of the earth. Only the first few spheroidal modes are sensitive to the density of the inner core; they are particularly sensitive to the density of the outer part of the core. The low-order spheroidal modes also exhibit a rapid rise of potential energy near the base of the mantle; this rise will permit improved estimates of the velocity to be obtained in this region, which is difficult to examine with body waves. The tabulated results allow estimates to be made of the previously neglected energy contained in the free oscillations excited by large earthquakes. An estimate of the energy in the low-order spheroidal oscillations excited by the great Alaskan shock suggests a value of 10 to the 23rd power ergs over the period range from 450 to 830 sec, implying that the energy density increases toward high frequencies if the total energy in the earthquake was of the order of 10 to the 24th-10 to the 25th power ergs.
AD-658 271 Not available from CFSTI.

NEAR-SURFACE DISPERSION STUDIES AT TONTO FOREST SEISMOLOGICAL OBSERVATORY,
Texas Instruments Inc Dallas
A. Frank Linville, and Stanley J. Laster. 5 May 66, 33p
AFOSR-67-2090
Contract AF 49 (638)-1244
Availability: Published in Bulletin of the Seismological Society of America v57 n3 p311-40 Jun 1967.

Descriptors: (*Seismology, *Seismological stations), Terrain, Explosions, Calibration, Geological survey, Seismic waves, Propagation, Frequency, Scattering, Arizona.

Four local seismic events digitally recorded on a crossed-linear array have been analyzed to evaluate the representation of wave propagation in inhomogeneous earth models in terms of 'local' dispersion. The analysis techniques studied are based primarily on the correlation properties of the signals at various receivers. Frequency-wave number spectra are computed for the events by various methods, and a comparison of the results indicates that the best method is a combination using averaged correlations computed from pre-whitened data. The utility of computing dispersion curves from an estimation of the 'transfer function' has been evaluated. The studies show the necessity of recording data directly 'inline' in areas of rough topography between source and array if 'local' dispersion is to be measured. Multichannel prediction studies indicate that the signals are highly nonstationary in space. (Author)
AD-658 274 Not available from CFSTI.

REFLECTION AND TRANSMISSION FROM A PLANE LAYERED CORE-MANTLE BOUNDARY,
California Inst of Tech Pasadena Div of Geological Sciences
Ta-Liang Teng. 14 Nov 66, 25p Rept no. Contrib-1430
AFOSR-67-2147
Contract AF 49 (638)-1337
Availability: Published in Bulletin of the Seismological Society of America v57 n3 p477-99 Jun 1967.

Descriptors: (*Seismic waves, Reflection), (*Functions, *Structural geology), Computer programs, Sensitivity, Theory, Distortion, Thickness, Tables.
Identifiers: FORTRAN.

A class of transfer functions in terms of layer matrices is derived, giving the transmission and reflection of plane harmonid P or S waves incident from either side of a plane layered core-mantle boundary. A computer program coded in complex arithmetic for the IBM 7094 is used to evaluate these functions. Numerical values obtained from five suggested models of the core-mantle boundary are compared and discussed. The aim is to formulate the method, and to establish some general guide, for the studies of the structure of the core-mantle boundary and the attenuation of seismic waves inside the core. (Author)
AD-658 358 Not available from CFSTI.

A MICRO-EARTHQUAKE SURVEY OF THE SAN ANDREAS FAULT SYSTEM IN SOUTHERN CALIFORNIA,
California Inst of Tech Pasadena Div of Geological Sciences
James N. Brune, and Clarence R. Allen. 22 Sep 66, 22p Rept no. Contrib-1422
AFOSR-67-2143
Contract AF 49 (638)-1337
Availability: Published in Bulletin of the Seismological Society of America v57 n2 p277-96 Apr 1967.

Descriptors: (*Earthquakes, California), (*Faults (Geology), California), Microseisms, Instrumentation, Seismometers, Tables, Noise, Measurement.

Micro-earthquakes have been systematically recorded with magnitudes down to -1.3 at more than 60 sites along the San Andreas fault system in southern California during intervals of 2 days to 1 year, representing more than 35,000 hours of usable records. Eight trailer-mounted instruments were operated with peak gains of 4-8 million at 20 cps with noise levels averaging about 0.1 mu amplitude of ground motion. Observed micro-earthquake activity varies from virtually nil along the central section of the San Andreas fault to more than 75 shocks daily in the Imperial Valley. Quietest is the 300-km segment between Cholame and Valyermo; more than one year of recording at Lake Hughes indicates an average of only one micro-earthquake within 24 km every nine days. Most areas where regional strain or fault creep have been demonstrated by geodetic measurements are also areas of high micro-earthquake activity. Existence of an area of minimal micro-earthquake activity within a broad region of active tectonism, and indeed along the very segment of the fault that broke in the great 1857 earthquake, suggests that short-term micro-earthquake activity is not necessarily positively correlated with long-term activity and with earthquake hazard, and in some areas the relationship may be inverse. However, areal distribution of micro-earthquake activity is grossly similar to that of larger earthquakes (M = to or > 3) during the past 29 years, and in many areas micro-earthquake activity can be approximately predicted by extrapolation of 29-year recurrence curves based solely on larger earthquakes. (Author)
AD-658 359 Not available from CFSTI.

SEISMIC EVIDENCE FOR A NEW LAYERED STRUCTURE OF THE EARTH'S CORE,
Lamont Geological Observatory Palisades N Y
Kazim Ergin. 6 Mar 67, 21p Rept no. Contrib-1056
AFOSR-67-2115
Grant AF-AFOSR-887-65
Prepared in cooperation with Technical Univ. of Istanbul (Turkey). Dept. of Mining Engineering.
Availability: Published in Journal of Geophysical Research v72 n14 p3669-87 Jul 15 1967.

Descriptors: (*Seismology, Earthquakes), (*Structural geology, Earth (Planet)), Velocity, Seismological stations, Networks, Epicenter, Computers, Measurement, Time, Tables.

Observed travel times and amplitude-distance curves based on new WWSSN data are used to deduce a detailed structure of the earth's core and lower mantle. The presence of PKP2 near and beyond 180 degrees, the persistence of P as far as 136 degrees, branching of PKP2, delays and branching of PKIKP, reflections from the inner core and the locations of caustics are some of the phenomena studied. A model which explains the new data comprises a decrease of mantle velocity near the core and layering within the inner and outer regions of the core. (Author)
AD-658 364 Not available from CFSTI.

EXCITATION OF SURFACE WAVES BY EVENTS IN SOUTHERN ALGERIA,
Lamont Geological Observatory Palisades N Y
Robert C. Liebermann, and Paul W. Pomeroy. 14 Mar 67, 6p
AFOSR-67-2149
Contract AF 49 (638)-1723
Availability: Published in Science v156 n3778 p1098-1100 May 26 1967.

Descriptors: (*Seismology, Algeria), (*Underground explosions, Measurement), Excitation, Surface properties, Epicenter, Seismological stations, Rayleigh waves, Tables.

Surface-wave magnitudes (Ms) of 4.1 and 3.2 are determined for two events in southern Algeria. The corresponding body-wave magnitudes (mb) are 5.8 and 4.9, respectively. The surface waves from these events are much smaller than would be expected from most earthquakes of comparable body-wave magnitudes, which fact suggests that these waves were generated by underground explosions. (Author)
AD-658 367 Not available from CFSTI.

EVIDENCE FOR THE SEAT OF THE STRAIN-PRODUCING FORCES,
National Observatory of Athens (Greece) Seismological Inst
A. G. Galanopoulos. 1 Sep 65, 17p Rept no. Scientific-7
AFOSR-67-2144
Contract AF 61 (052)-803
Availability: Published in Annali di Geofisica v18 n4 p399-409 1965.

Descriptors: (*Seismology, Greece), (*Structural geology, *Earthquakes), Measurement, Seismic waves, Volume, Surface properties, Intensity, Faults (Geology), Tables.

Evidence is presented which favors the theory that the seat of the strain-producing forces is in the low-rigidity layer near the top of the mantle. (Author)
AD-658 394 Not available from CFSTI.

PRELIMINARY RESULTS OF AN INVESTIGATION OF CRUSTAL STRUCTURE IN SOUTHEASTERN EUROPE,
National Observatory of Athens (Greece) Seismological Inst
B. Papazachos, P. Comninakis, and J. Drakopoulos. Sep 66, 31p Rept no. Scientific-3
AFOSR-67-2158
Contract AF 61 (052)-803
Availability: Published in Bulletin of the Seismological Society of America v56 n6 p1241-68 Dec 1966.

Descriptors: (*Seismology, Earthquakes), (*Structural geology, Thickness), Epicenter, Seismomet-

ers, Refraction, Seismological stations, Reflection, Poissons ratio, Least squares method, Greece, Eastern Europe.

Travel-time curves for the most prominent phases of the longitudinal and shear waves for epicentral distances between zero and 140 km and between 200 km and 1000 km have been constructed for Southeastern Europe. Both refraction and reflection methods indicate a three-layered crust. The average thickness is approximately 16km for the top layer, 15 for the middle layer and 11 for the lower layer. The crustal thickness varies from about 47 to 32 km from place to place. The extremely low value 0.21 for Poisson's ratio was found in the top as well as in the middle layer. (Author)
AD-658 395 Not available from CFSTI.

THE PUERTO RICO TRENCH.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8J.
AD-658 402 Not available from CFSTI.

THE GEOLOGY OF THE WESTERN APPROACHES OF THE ENGLISH CHANNEL. V. THE CONTINENTAL MARGIN AND SHELF UNDER THE SOUTH CELTIC SEA.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8G.
AD-658 405 Not available from CFSTI.

CRUSTAL STRUCTURE OF THE MEDITERRANEAN SEA BY SURFACE WAVES. PART I. GROUP VELOCITY,
Observatorio Central Geofisico Toledo (Spain)
For primary bibliographic entry see Field 8G.
AD-658 409 Not available from CFSTI.

SITE SELECTION FOR A SEISMIC ARRAY STATION AND CRUSTAL STUDIES IN NORWAY FINAL REPORT, 1 APR. 1965 - 31 DEC. 1966.
Bergen Univ. (Norway). Seismological Observatory.
M. A. Sellevoll, and A. Sornes. 21 Feb 67, 109p
AFOSR-67-1370, AD-653979
Contracts AF 61/052/-859, ARPA ORDER 612-1

Descriptors: *Antenna array, *Meteorological station, *Norway, *Research facility, *Seismic wave, Antenna, Array, Crust, Earth, Explosion, Facility, Long, Measurement, Meteorology, Noise, Nuclear, Range, Ratio, Relocation, Research, Seismic, Selection, Signal, Site, Station, Underground, Wave.

For abstract, see STAR 05 20.
N67-34188 HC$3.00 MF$0.65

TIME SERIES ANALYSIS AS APPLIED TO CONTINENTAL MARGIN REFRACTION DATA.
Master's thesis,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
Richard H. Merkel. 1967, 99p
Grant NSF-GP-4300
Rept. on East Coast On-Shore Off-Shore Seismic Experiment.

Descriptors: (*Time series analysis, *Seismology), (*Seismic waves, *Refraction), Least squares method, Earthquakes, Frequency, Explosions, Noise, Signals, Ocean bottom, Correlation techniques.

Numerical time series analysis has been applied in the study of a set of refraction records which were obtained from a series of explosions detonated on the continental margin east of the Maryland coast. The shots were fired along two lines; one parallel and the other normal to the continental shelf, and received on 25 geophone array stationed on the western shore of the Chesapeake Bay. A correlation technique was developed which made it possible not only to find arrivals which were buried in the noise, but also to distinguish between arrivals which were not separated in time. Velocity-depth calculations were made and compared. The crustal layers overlying the Moho were found to dip west on the continental shelf area, and dip east under the continent, while striking approximately north-south in both regions. (Author)
PB-175 944 HC$3.00 MF$0.65

8L. Snow, Ice, and Permafrost

PENDULUM STEERING FOR THERMAL PROBES IN GLACIERS.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Haldor W. C. Aamot. Jul 67, 11p Rept no. CRREL-SR-116

Descriptors: (*Glaciers, *Thermal properties), (*Drilling, Glaciers), Conductivity, Stability, Penetration, Costs, Machine tools, Drills, Ice, Drilling machines, Temperature, Design, Gravity, Cold weather tests.

Pendulum steering, a new concept of attitude stabilization for thermal probes or coring drills in ice, eliminates instability. The center of support is placed above the center of gravity. A lower and upper hot point produce melt penetration. The ratio of their power levels is the basis for stabilization, which is provided by the automatic control of the heater in the upper hot point. This feature makes possible a single thermal probe design that is suitable for all ice cap temperatures and a wide range of penetration rates (i.e., applied power levels). The simplicity of a thermal probe with pendulum steering suggests availability at modest cost and versatility as a widely applicable tool. (Author)
AD-657 581 HC$3.00 MF$0.65

SOUTHERN HEMISPHERE GLACIER ATLAS.
Technical rept.,
American Geographical Society New York
John H. Mercer. Jun 67, 306p
USA-NLABS-TR-67-76-ES, ES-33
Contract DA-49-092-ARO-25

Descriptors: (*Glaciers, Southern Hemisphere), (*Maps, Glaciers), Terrain, Indexes, Mountains, History, Distribution, Mapping.

The study is a literature survey of knowledge on mountain glaciers in the Southern Hemisphere. The Southern Hemisphere is divided into the following regional categories with respect to glaciers: The Andes of South America, Ecuador, Peru, Bolivia, Chile, and Argentina, New Guinea, East Africa, Sub-Antarctic Islands, New Zealand, and Antarctica. Included are discussions on the distribution, extent, characteristics, and behaviour of mountain glaciers and an extensive list of references for each regional discussion. A history of observations and current research programs is incorporated in the text. Nineteen new maps have been prepared on the mountain glaciers in the Southern Hemisphere. (Autvor)
AD-657 668 HC$3.00 MF$0.65

CALCULATING THERMAL REGIME AND MASS BUDGET OF SEA ICE.
Technical rept.,
Washington Univ Seattle Dept of Atmospheric Sciences
Norbert Untersteiner. 1966, 12p Rept no. TR-27, Contrib-120
Contract Nonr-477 (24)
Availability: Published in Symposium on the Arctic Heat Budget and Atmospheric Circulation, Proceedings p205-13 1966.

Descriptors: (*Sea ice, Mathematical models), Heat flux, Thickness, Equations, Thermal properties, Snow, Temperature, Climatology.

A mathematical model for predicting thickness and temperature of sea ice is described. It consists of the equations of heat conduction for both snow and ice, with variable thermal constants and a term representing internal heating by radiation. The boundary conditions at the interfaces with the atmosphere and the ocean are given in the form of heat budget equations. The fluxes of radiative, latent, and sensible heat are treated as independent parameters (except for the infrared emission from the surface, which is calculated). This model is being programmed for long-term (several years) integration with various combinations of heat fluxes in the atmospheric and oceanic boundary layers, and should provide some insight into the relation of climatic change to ice production, decay, and equilibrium thickness. (Author)
AD-657 921 Not available from CFSTI.

SEA ICE.
Technical rept.,
Washington Univ Seattle Dept of Atmospheric Sciences
N. Untersteiner. 1966, 7p Rept no. TR-26, Contrib-129
Contract Nonr-477 (24)
Availability: Published in Encyclopedia of Oceanography p777-81 1966.

Descriptors: (*Sea ice, *Sea water), Salinity, Heat flux, Surface temperatures, Oceans, Thickness, Snow, Physical properties, Density, Arctic regions.

Sea ice is here defined as ice formed by the freezing of seawater (it excludes icebergs and other forms of land ice). Normal seawater of 35% salinity (S, grams of salt per 1000 grams of seawater) freezes at a temperature of -1.9C. Unlike fresh water which reaches its maximum density at +4C, the temperature of maximum density of seawater depends on its salinity. For S greater than 24.7%, the temperature of maximum density lies below the freezing point. The growth rate of sea ice depends primarily on surface temperature, depth of snow cover, and turbulent heat flux in the underlying water. (Author)
AD-657 924 Not available from CFSTI.

OCEANOGRAPHIC ATLAS OF THE NORTH ATLANTIC OCEAN. SECTION II. PHYSICAL PROPERTIES.
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 8J.
AD-658 219 HC$4.00

GREAT LAKES ICE COVER WINTER 1965-66.
Basic Data rept.,
United States Lake Survey Detroit Mich
Donald R. Rondy. Dec 66, 52p Rept no. BD-5-2

Descriptors: (*Ice, Great Lakes), Climatology, Meteorology, Periodic variations, Aerial reconnaissance, Mapping, Temperature, Maps.

The report describes the U. S. Lake Survey's 1965-66 aerial ice reconnaissance program and presents 22 ice charts produced from 12 ice reconnaissance flights. A brief description of ice conditions on each of the Great Lakes and a summary of weather conditions is included. (Author)
AD-658 227 HC$3.00 MF$0.65

BIBLIOGRAPHY ON SNOW, ICE AND FROZEN GROUND WITH ABSTRACTS. VOLUME XXI.
Cold Regions Research and Engineering Lab Hanover N H

Jun 67, 296p Rept no. CRREL-12-Vol-21
See also AD-621 041.

Descriptors: (*Snow, Bibliographies), (*Ice, Bibliographies), Polar regions, Abstracts, Indexes, Permafrost, Scientific research.

The bibliography provides USA CRREL with a current and comprehensive coverage of basic and applied scientific research on snow, ice, and frozen ground, as well as living and working in polar regions and other cold areas. The present volume contains abstracts SIP 24201-25200. (Author)
AD-658 229 HC$3.00 MF$0.65

MASS SOIL MOVEMENTS IN THE H. J. ANDREWS EXPERIMENTAL FOREST.
Research paper,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
C. T. Dryrness. 1967, 17p RP-PNW-42

Descriptors: (*Soils, *Avalanches), (*Forestry, Soils), Storms, Damage, Rock (Geology), Rotation, Drainage, Water, Erosion, Terrain.

Analyzes 47 mass movement events resulting from severe storms during the winter of 1964-65. Earthflow and channel scouring events were the most common. About 72 percent of the mass movements occurred in connection with roads and 17 percent in logged areas. Over 94 percent of the events occurred in areas of tuff and/or breccia bedrock which occupy only 37 percent of the total area. (Author)
PB-175 711 HC$3.00 MF$0.65

SNOW PREDICTION IN THE EASTERN UNITED STATES.
New York Univ., N. Y. Geophysical Sciences Lab.
For primary bibliographic entry see Field 4B.
PB-175 803 HC$3.00 MF$0.65

SNOW FORECASTING PROCEDURES IN THE CENTRAL UNITED STATES.
Atmospheric Research and Development Corp., Kansas City, Mo.
For primary bibliographic entry see Field 4B.
PB-175 804 HC$3.00 MF$0.65

8M. Soil Mechanics

SURFACE ENERGY BALANCE OF BARE SOIL AS INFLUENCED BY WETTING AND DRYING.
Interim research rept.,
Agricultural Research Service Tempe Ariz Water Conservation Lab
C. M. Van Bavel. Jun 67, 74p Rept no. RR-397 ECOM-2-67P-2

Descriptors: (*Soils, *Heat transfer), Wetting, Drying, Evaporation, Heat flux, Surface properties, Instrumentation, Laboratories, Energy, Surface temperatures.

A bare soil surface of Adelanto clay loam was allowed to dry superficially and then flooded with 11 cm of water. Physical events over, at and below the surface were recorded continuously throughout eight days, beginning with the day before flooding. The terminal condition was close to the original one. The experiment took place in April-May 1966 in Phoenix, Arizona during a period of stable, clear and dry weather. When the surface was dry, net radiation and soil heat flow were the principal energy transfer processes. When the soil surface was wet, net radiation and latent heat transfer predominated, but soil heat flow was still more important than sensible heat transfer in the air. The last quantity did not change much in size or magnitude as result of flooding and remained negative during the daylight period. A surprising result was obtained for the period during which the surface first became dry, firm and lighter in color. Though net radiation was decreased, evaporation continued at the potential rate and large, positive values of sensible heat flux in the air were measured. These values did not agree with the measured differences between surface and air temperature, but it was also noted that any aerodynamic method, used to calculate the sensible heat flow in the air from surface temperatures, failed utterly. Excellent predictions of the latent heat flux during wet surface conditions were obtained with the Dalton-log law model and also with the combination model. Less accurate, but still acceptable prediction followed from the Bowen ratio method. (Author)
AD-657 634 HC$3.00 MF$0.65

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SOILS WITH PENETROMETERS.
Texas Univ., Austin.
W. R. Cox, and D. P. Womack. Aug 67, 124p NASA-CR-849
Contract NAS9-3559, Grant NSG-604

Descriptors: *Dynamic load, *Impact test, *Penetrometer, *Soil, Density, Dynamic, Impact, Load, Measurement, Moisture, Projectile, Response, Static, Strength, Test.

For abstract, see STAR 05 20.
N67-34028 HC$3.00 MF$0.65

MASS SOIL MOVEMENTS IN THE H. J. ANDREWS EXPERIMENTAL FOREST.
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
For primary bibliographic entry see Field 8L.
PB-175 711 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. INTERIM REPORT I: PRELIMINARY PLANNING,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
T. Allan Haliburton. Jun 66, 47p
Prepared in cooperation with State of Oklahoma, Department of Highways, and Bureau of Public Roads, Washington, D. C. See also PB-175 740.

Descriptors: (*Soil mechanics, Moisture), Roads, Pavements, Foundations (Structures), Civil engineering, Measurement, Test methods, Probes, Nuclear radiation, Density.

The scope of the overall research study is stated to be fourfold: (1) to develop an effective method of measuring long-term subgrade moisture variations, (2) to develop procedures for making these measurements throughout Oklahoma, (3) to relate measured subgrade moisture variations to existing soil, climatological, and highway pavement conditions, and hopefully, (4) to suggest revisions in current design procedures to prolong useful highway life. The nine problems to be solved and the activities for their solution are listed. Current utilization of nuclear equipment by various agencies is reviewed and procedures for calibration of nuclear depth equipment are suggested. The problems of access tube installation are discussed and work in this area by both other agencies and the research project is summarized. Operational theory is given for nuclear depth equipment and a preliminary plan for research project operations is presented. (Author)
PB-175 739 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. INTERIM REPORT II: ACCESS TUBE INSTALLATION,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
Wayne L. Heiliger, and T. Allan Haliburton. Jan 67, 59p
Prepared in cooperation with State of Oklahoma, Dept. of Highways, and Bureau of Public Roads, Washington, D. C. See also PB-175 739.

Descriptors: (*Soil mechanics, Moisture), Roads, Pavements, Foundations (Structures), Civil engineering, Measurement, Test methods, Probes, Installation, Pipes, Nuclear radiation, Density, Drilling, Drills.

A method for field installation of access tubes for nuclear depth moisture and density equipment is described. After review of previous installation methods, it was concluded that a special drilling unit was required to auger the heavy clays encountered in Oklahoma. The equipment is described in detail, as is the exact procedure used in field installation of access tubes beneath highway pavements. Using the equipment and methods described in this report, 30 test sites of three access tubes each were installed during the summer of 1966. More test sites are planned for future installation. (Author)
PB-175 740 HC$3.00 MF$0.65

SHEAR STRENGTH AND ELASTIC PROPERTIES OF LIME-SOIL MIXTURES,
Illinois Univ., Urbana. Highway Research Lab.
Marshall R. Thompson. Jan 67, 16p Highway Engineering Ser-20
Prepared in cooperation with Illinois State Div. of Highways, Illinois Cooperative Highway Research Program Series-66.

Descriptors: (*Soils, Mechanical properties), Elasticity, Calcium compounds, Hydrates, Moisture, Pavements, Mixtures, Stresses, Regression analysis.

The shear strength and elastic properties of soil-lime mixtures and the effects of curing time and soil type on these properties were studied using four typical Illinois soils. Regression equations relating cohesion and modulus of elasticity to unconfined compressive strength were developed. Among the authors conclusions are: Lime substantially increases shear strength due to large increases in cohesion and small increases in the angle of internal friction. Lime increases modulus of elasticity. E line-soil/E soil ranges from 3 to 25. Increased curing time increases shear strength and moduli of elasticity. Cohesion, C=9.3 + .292 q sub u (psi); (q sub u=unconfined compressive strength) Modulus of Elasticity, E=9.98 + .1235 q sub u (psi). (q sub u=unconfined compressive strength). Ultimate failure strain for lime-soil mixtures is less than that for untreated soil. Ultimate failure strain is independent of soil type and curing time. The shear strengths of the mixture studied were sufficient to prevent shear failure of the lime stabilized layer of a typical flexible pavement structure. Flexural strength will thus be the controlling factor in rational design of lime-soil mixtures. (Author)
PB-175 741 HC$3.00 MF$0.65

DETERMINATION OF EMBANKMENT DENSITY BY THE SEISMIC METHOD.
New York State Dept. of Public Works. Bureau of Physical Research.
For primary bibliographic entry see Field 13B.
PB-175 763 HC$3.00 MF$0.65

DEVELOPMENT OF A RAPID FIELD TEST FOR EVALUATING THE EXPANSIVE POTENTIAL OF CLAY SOILS DURING CONSTRUCTION.
Research rept.,
California State Div. of Highways. Materials and Research Dept.
Ernest Zube. Jun 67, 24p M/R-633139-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Tests), Clay, Particle size, Roads, Construction, Pressure, Cements, Temperature, Pavements, Classification, Chemicals.

A test was developed which uses a soap solution for expanding the clay particles, then a flocculating

agent (Separan NP-10) to obtain column of sediment in a glass graduate. The column height was correlated with the expansive potential of the soil. The authors indicate that the test appears to correlate reasonably well with Test Method No. Calif. 354 'Method of Test for Evaluating the Expansive Potential of Soils Underlying Portland Cement Concrete' and can classify soils into groups requiring 24 inches or less of cover and those that are more expansive and require further testing. They also indicate that it is difficult to determine what the test procedure measures, as column height is not directly proportional to the expansion of the soils tested. (Author)
PB-175 768 HC$3.00 MF$0.65

ANALYSIS OF LAYERED SYSTEMS. INTERIM REPORT ON PHASE II. STRESSES AND DISPLACEMENTS IN NONLINEAR SOIL MEDIA,
Virginia Highway Research Council, Charlottesville.
Y. H. Huang. Apr 67, 34p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Stresses), Elasticity, Computers, Mathematical prediction, Differential equations.

A method is presented for determining the vertical stresses and displacements in semi-infinite nonlinear soil media under circular loaded areas. The soil is assumed to be incompressible with an elastic modulus varying with the state of the stresses. The medium is arbitrarily divided into seven layers in which the stresses and displacements are determined by a high speed computer using Burmister's layered theory and the principle of successive approximations. The results of this study reveal that the nonlinear behavior of soils has a relatively small effect on stresses but a large effect on displacements. This may explain why Boussinesq's solution of stresses based on linear theory has been applied to soils with great success even though soils themselves are basically nonlinear. Since the differences in stresses between linear and nonlinear theory are not too significant, the displacements in a nonlinear medium can be estimated by a simplified method based on Boussinesq's stress distribution. It is found that this simplified method checks closely with the method presented, especially at large radial distances. (Author)
PB-175 943 HC$3.00 MF$0.65

CLAY MINERALOGY AND CHEMISTRY OF SELECTED WASHINGTON COUNTY, ARKANSAS, SOILS AND EFFECTS ON THEIR ENGINEERING PROPERTIES.
Technical rept.,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
Merlin E. Horn, and Wendell R. Coston. Apr 67, 53p TR-4
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Rept. on 'Effects of Chemical and Mineralogical Properties on the Engineering Characteristics of Arkansas Soils.'

Descriptors: (*Soils, *Physical properties), (*Chemical properties, Soils), Particle size, pH, Surface properties, Minerals, Clay, Sandstone, Civil engineering, Shale, Arkansas.

Representative samples of the major horizons of seven principal soil series of Washington County, Arkansas (from sandstone residuum and from alluvium and colluvium derived from sandstone, shales and siltstones of the Boston Mountains) were tested and analyzed in the laboratory for particle size distribution, cation exchange relations, surface area, maximum density-optimum moisture, pH, organic matter, kinds and amounts of clay minerals, Atterberg limits, amorphous materials. The data are used to provide qualitative estmates and explanations of engineering usages and properties of the soils. (Author)
PB-175 953 HC$3.00 MF$0.65

8N. Terrestrial Magnetism

THE WESTWARD DRIFT AND GEOMAGNETIC SECULAR CHANGE,
Rand Corp Santa Monica Calif
E. H. Vestine, and Anne B. Kahle. Sep 67, 19p Rept no. P-3667
Availability: Published in Geophysical Journal of Royal Astronomical Soc. 19p nd.

Descriptors: (*Earth (Planet), Rotation), (*Terrestrial magnetism, Earth (Planet)), Periodic variations, Thickness, Motion, Velocity, Magnetic fields, Reynolds number.

Short-term fluctuations in the length of the day on the order of a decade are discussed in relation to fluctuations in westward drift of the outer part of the earth's core. Decreases in the earth's rotation rate noted near 1910 and 1965 are shown to be correlated with decreases in westward drift of the earth's magnetic eccentric dipole, which probably originates fairly deep within the earth's core. If the outer two-hundred-km thickness of the core moves approximately as does the eccentric dipole field, the changes in angular momentum implied for this part can explain the observed changes in the length of the astronomical second, on the basis of conservation of angular momentum. Other estimates of westward drift in the core based on higher-degree harmonic terms give a lower westward drift, and also seem to show less precision in the estimates of flow in the core. These discrepancies are unexplained. (Author)
AD-657 807 Not available from CFSTI.

THE MICROWAVE SURFACE RESISTANCE OF SUPERCONDUCTING LEAD, TRAPPED MAGNETIC FLUX, AND A NEW MAGNETOMETER USING SUPERCONDUCTIVITY.
Stanford Univ Calif High Energy Physics Lab
For primary bibliographic entry see Field 20C.
AD-657 931 HC$3.00 MF$0.65

OCEANIC ELECTRIC CURRENTS, GEOMAGNETIC VARIATIONS AND THE DEEP ELECTRICAL CONDUCTIVITY STRUCTURE OF THE OCEAN-CONTINENT TRANSITION OF CENTRAL CALIFORNIA,
Scripps Institution of Oceanography La Jolla Calif
Jean H. Filloux. 30 Jun 67, 186p Rept no. SIO-Ref-67-18
Contract Nonr-2216 (23)

Descriptors: (*Ocean currents, Terrestrial magnetism), (*Terrestrial magnetism, *Electric fields), Oceans, Magnetometers, Numerical analysis, Ocean bottom, Conductivity, Depth finding, Rock (Geology), Temperature, Pressure, Electromagnetic fields, Magnetic properties.

The variations of electromagnetic field components along a line across central California have been examined in the frequency range .125 to 4 cph by means of an array of stations extending from 320 km inland to 630 km offshore. The three components of the magnetic variations were recorded at six land positions. Simultaneously, records of the oceanic electric field in a direction approximately parallel to the coast were obtained at three stations located as far as 150 km offshore by using self-contained recorders installed on the sea floor. The cross-correlation of all field components leads to field relationships suggesting a large-scale, nearly two-dimensional structure of the electrical conductivity of the earth's crust and upper mantle in a region adjacent to the California coast. Estimates of the continental and oceanic conductivity distribution with depth were carried out by solving numerical models. The estimate of the offshore conductivity profile based on models of the coastal cross section are in excellent agreement with the independent magnetotelluric sounding. In the light of the present knowledge of the properties of rocks at high pressure and temperature, the high electrical conductivity of the oceanic basement favors a highly basaltic external mantle shell, extending to no less than 30 km below the Mohorovicic discontinuity. (Author)
AD-657 935 HC$3.00 MF$0.65

THE TOTAL MAGNETIC FIELD VARIOMETER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. A. Tiedeman. 25 Jun 53, 22p Rept no. CF-2044

Descriptors: (*Magnetometers, Recording systems), Magnetic fields, Terrestrial magnetism, Phototubes, Amplifiers, Magnets.

Because of the increasing use which is being made of the total earth's magnetic field, continuous monitoring of its variations is becoming important. The total field variometer is designed to give a continuous record of these variations continuously available without photographic processing. (Author)
AD-658 091 HC$3.00 MF$0.65

ON CURRENTS PRODUCING THE MAIN PHASE OF A MAGNETIC STORM,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Alfred J. Zmuda. 8 Sep 61, 12p Rept no. CF-2943
Contract NOrd-7386

Descriptors: (*Magnetic storms, Magnetic anomaly detection), Atmospheric motion, Van Allen radiation belt, Terrestrial magnetism, Electrons, Protons, Density, Theory.

The location of the magnetic anomaly detected with Mechta I coupled with other considerations suggests that the current flowing in the outer Van Allen belt has a distribution with maxima at 25 degrees north and south geomagnetic latitude, and at a geocentric altitude of about 3 earth radii. A current of this type could produce the equatorial and middle-latitude surface variations observed during the main phase of a magnetic storm, variations which (as is well known) could also be due to a current, such as a ring current, with a maximum in the equatorial plane. In the region above the earth's surface the fields of the two types of current distributions are substantially different and hence readily distinguishable. (Author)
AD-658 380 HC$3.00 MF$0.65

MAGNETIC CHART OF THE BRAZILIAN ANOMALY - A VERIFICATION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. C. Cain, S. J. Hendricks, and R. A. Langel. Aug 67, 13p NASA-TM-X-55876, X-612-67-373

Descriptors: *Brazil, *Geomagnetic anomaly, Cosmos satellite, Least, Mapping, Measurement, Method, Ogo-b, Satellite, Square.

For abstract, see STAR 05 20.
N67-34176 HC$3.00 MF$0.65

REPORT OF THE GEOMAGNETIC AND GEOELECTRIC OBSERVATIONS, 1965 (RAPID VARIATIONS).
Kakioka Magnetic Observatory (Japan).
1966, 128p REPT.-6

Descriptors: *Geomagnetic effect, *Geophysical observatory, *Magnetic measurement, Bay, Effect, Flare, Geomagnetic, Geophysics, Impulse, Japan, Magnetic, Magnetogram, Measurement, Observatory, Pulse, Sensitivity, Solar, Storm, Sudden, Table, Tellurometer.

For abstract, see STAR 05 20.
N67-34454 HC$3.00 MF$0.65

9. ELECTRONICS AND ELECTRICAL ENGINEERING

PROCEEDINGS OF THE 1966 SYMPOSIUM ON ENGINEERING PROBLEMS OF CONTROLLED THERMONUCLEAR RESEARCH HELD OCTOBER 3-6, 1966, IN GATLINBURG, TENNESSEE.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 17.
CONF-661016 HC$3.00 MF$0.65

9A. Components

STUDY OF I-F TRANSFORMERS FOR SINGLE SIDEBAND OPERATION.
Final rept. 1 Feb 60-31 Oct 61,
Illinois Inst. of Tech., Chicago. Electronics Research Lab.
Lester C. Peach, and Erwin W. Weber. 31 Oct 61, 81p
Contract DA-36-039-sc-78342

Descriptors: (*Intermediate frequency, *Transformers), (*Radiofrequency filters, *Band-pass filters), Piezoelectric crystals, Circuits, Quartz resonators, Sidebands, Synthesis, Design, Digital computers, Programming (Computers), Functions, Polynomials, Matrix algebra, Coding, Numerical methods and procedures.

A numerical method of synthesis is described. The method allows one to choose the type of network, determine an approximation, and realize the network. The theory of the numerical methods is presented. A computer program for a Burroughs 220 digital computer is included.
AD-275 166 HC$3.00

PRELIMINARY REPORT ON NUCLEAR RADIATION EFFECTS ON PIEZOELECTRICS.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 18H.
AD-466 277 HC$3.00 MF$0.65

FEASIBILITY STUDY OF SHIELDING TECHNIQUES.
Final rept. 1 Jun 63-30 Nov 64,
Boeing Co., Seattle, Wash.
Vellar C. Plantz. 8 Jul 65, 193p Rept. no. D6-8597-5
Contract DA-36-039-AMC-02308 (E)

Descriptors: (*Electromagnetic shielding, Feasibility studies), Antenna radiation patterns, Electric filters, X Band, Low frequency, Electrical impedance, Measurement, Effectiveness, Magnetic fields, Attenuation, Ultrahigh frequency, Phase shift, Instrumentation, Electronic equipment, Wave transmission, Radio waves, Resonance, Electrical properties, Thickness, Performance (Engineering).

Two significant results of basic utility in understanding and designing electromagnetic shielding are presented along with two resulting patent disclosures. It also details the basic theory and analytic and experimental approaches employed in obtaining these results. A technique based upon sound engineering principles was developed for the design of shielding enclosures. Substantiating though limited design data has been obtained. The basic approach was to consider transmission of wave energy through a shielding barrier in a manner analogous to conventional transmission-line heory. During the performance of the study, resonance effects in a number of shielding enclosures were observed in the frequency range of 5 to 150 kc. These are explained as resulting from large differences in phase shift between parallel transmission paths; one through the shielding material and the other through seams under certain conditions of transmission. Since these effects are believed to be newly discovered, they serve as the basis for two patent disclosures made under the program. (Author)
AD-466 293 HC$3.00 MF$0.65

FLAT CABLES FOR LIGHTWEIGHT INTERCONNECTIONS,
Army Electronics Command, Fort Monmouth, N. J.
Elmer F. Godwin, and Gerard J. Reilly. Dec 65, 41p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1 Dec 65.

Descriptors: (*Electric cables, Microminiaturization (Electronics)), Electric insulation, Laminates, Bonding, Glass textiles, Polyester plastics, Aging (Materials), Accelerated testing, Thermal shock, Tensile properties, Vibration, Circuit interconnections.

The data obtained for the tests conducted indicates that flat conductor cables can be manufactured to meet application requirements of Army ground support equipments, missile and space vehicles. However, additional studies are required to determine the behaviour and reliability of flat cables at various temperature extremes and space environments. Although the data indicates that flat cable can be manufactured to meet specific requirements, considerable differences were obtained between similar constructed cables, fabricated with the same insulants but by different manufacturers. In general, each manufacturer seemed adept in the manufacture of a specific cable design. The majority of cables failed to meet the elongation requirements of 1% and the teflon insulated cables failed to meet the 5000 psi tensile strength requirements, however, the remaining cables meet the requirements of NAS/IPC specification for the test conducted. Slight discolorations and warping as a result of various conditions were observed for many of the specimens. (Author)
AD-477 970 HC$3.00 MF$0.65

NEW CONNECTOR DESIGN LOWERS COST OF MILITARY CABLE ASSEMBLY PROCESSES,
Martin Co., Orlando, Fla.
J. D. Keller. Dec 65, 9p
Presented at the Annual Wire and Cable Symposium (14th), Atlantic City, N. J., Dec 65.

Descriptors: (*Electric connectors, *Electric cables), Design, Electric terminals, Soldering, Reliability, Electric wire, Welding, Crimping tools, Manufacturing methods, Configuration, Costs, Non-destructive testing, Electric insulation, Cable assemblies.

The new support terminal allows an operator to assemble wires without the use of pliers, testing can be achieved prior to soldering and connector joining can be mechanized. Manual operations are simplified in that there is no need for precise wrappings. Tacking permits assembly wiring without wire dislodgment usually encountered when wire ends are mechanically wrapped. Multiple connections can be accomplished and rework can proceed with ease. Assembly and inspector training is reduced with the improved terminal configuration. The new terminal increases flexure life by 200% over the cup type terminals. In the case of bifurcated terminals the flexure life rises to 500%. The flexure life of soldered connections with the support terminal is essentially equivalent to the flexure life of stranded wire from the spool. Thereas a 60% reduction in labor costs can be realized in the manual operation, wave soldering reduces the cost considerably more. Certain circular high wire density connectors have been known to require 30 hours for assembly. With flow soldering, and reduced wire tinning and preparation costs, the 30 hours can be reduced to less than one hour. One of the most significant advantages of soldering, as compared to welding and solderless connections, lies in the non-destructive test or inspection capability. Since solder joint assessment is fundamentally based on observation of flow characteristics an inspector need only to note the fact that flow to the window did occur. (Author)
AD-479 557 HC$3.00 MF$0.65

CHLORINATED POLYETHYLENE IN WIRE AND CABLE APPLICATIONS,
Allied Chemical Corp., Morristown, N. J. Plastics Div.
For primary bibliographic entry see Field 11I.
AD-479 559 HC$3.00 MF$0.65

A NOVEL FORM OF THERMAL BARRIER FOR COMMUNICATIONS CABLES,
Dow Chemical Co., Midland, Mich.
G. E. Clock, R. C. Mildner, H. A. Walters, and P. C. Woodland. Dec 65, 28p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1-3 Dec 65.

Descriptors: (*Barrier coatings, Thermal insulation), (*Electric cables, Communication equipment), (*Thermal insulation, *Plastic coatings), (*Protective coverings, Tests), Tapes, Temperature, Damage, Lightning, Shock resistance, Polyethylene plastics, Laminates, Electric insulation, Heat transfer, Isocyanate plastics, Halocarbon plastics, Expanded plastics.

The development and testing of a new and economical form of thermal barrier, which has thermal characteristics superior to those of core wraps currently in use, is described. In one recommended form, it comprises a foamable coating adherent to one side of the metal tape which is used as the cable shield. The coating may either be prefoamed immediately prior to jacketing by the use of external heat or be caused to foam by the heat of the extruded jacket itself. A laboratory test technique has been developed to estimate the core and shield temperatures generated during the jacketing process, and comparison is made with the temperatures calculated theoretically. The results of comparative tests, based on this laboratory technique are tabulated for all the common forms of thermal barrier proposed for use in communications cable. Reference is made to factory trials utilizing this form of barrier in a jacketed cable construction. These trials confirm the beneficial effect of the high thermal resistance and low thermal capacitance of the new thermal barrier. (Author)
AD-479 561 HC$3.00 MF$0.65

PROCESSING VARIABLES AND THEIR EFFECT ON THE FINAL PROPERTIES OF POLYETHYLENE CABLE JACKETS,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Plastics Dept.
David C. Sanders, and Robert L. Seeks. Dec 65, 15p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 30 Nov-3 Dec 65.

Descriptors: (*Electric cables, *Electric insulation), (*Polyethylene plastics, *Electric insulation), Extrusion, Manufacturing methods, Mechanical properties, Stresses, Shear stresses, Heat treatment, Processing, Failure (Mechanics), Degradation.

Processing conditions can exert considerable influence on the final properties of polyethylene after fabrication into a cable jacket. The loss of stress crack resistance occurs primarily as a result of the combination of reduction in molecular weight through shear, along with the retention of high levels of stress as a result of quick quenching.

Factors which lead to degradation of molecular weight include: (1) low extrusion temperatures, (2) shallow screws (high total shear) and (3) high barrel back pressures. It is impossible to completely eliminate degradation of molecular weight in the extrusion process, but by utilizing long barreled extruders, screws of recommended metering depths and extrusion temperatures in the range of 450 F. degradation can be minimized. The effect of a decrease in molecular weight on stress crack resistance depends highly upon the particular polyethylene in question. The other factor which leads to stress crack failures in cable jackets is the level of retained orientation from the extrusion process. Molecular orientation occurs in the process as a result of the application of shear and drawdown. In order for the polyethylene melt to come to a relaxed state, the jacket must be allowed to cool rather slowly. It is well-known that re-entanglement of the polymer molecules occurs at a time/temperature dependent rate. If the temperature of the melt is suddenly reduced, re-entanglement will stop, thereby freezing in orientation. In order to prevent this situation from occurring, slower cooling of the jacket becomes necessary. (Author)
AD-479 562 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN ETHYLENE-PROPYLENE POLYMERS FOR WIRE AND CABLE APPLICATIONS,
Enjay Labs., Linden, N. J.
For primary bibliographic entry see Field 11I.
AD-479 563 HC$3.00 MF$0.65

COMPRESSIBLE FLOW IN PRESSURIZED COMMUNICATION CABLE,
Scott Corp., Houston, Tex.
Joe S. Herring, and Richard T. Roach. Dec 65, 31p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J.,1-3 Dec 65.

Descriptors: (*Electric cables, Communication systems), (*Pressurization, Electric cables), Fluid Mechanics, Specifications, Maintenance, Costs, Reliability, Operation, Compressive properties, Resistance (Electrical), Theory, Flow fields, Temperature.

Cable Pressurization Programs initiated by the communication industry almost without exception have resulted in significant reductions in plant maintenance cost and increase in communication reliability. For the past twenty years, the knowledge of these benefits have permeated the industry and become accepted to the extent that all major systems are either pressurized, in process of pressurization, or in the engineering study phase of pressurization. What was once a trial concept under evaluation for possible improvement of communication performance has now become a generally accepted operating technique. It is not the purpose of this paper to discuss the 'pros' and 'cons' of pressurization since there are many individual concepts of these benefits. It will suffice for us to recognize that the concensus of opinion is favorable to pressurization. The paper is divided into two functional sections: the first covers the theoretical development of cable Pneumatic Characteristics relationships; and, the second portion describes the practical application of these relations to the operating cable plant. (Author)
AD-479 564 HC$3.00 MF$0.65

POLYSULFONE FOR WIRE AND CABLE,
Union Carbide Corp., New York. Plastics Div.
J. J. Helbling. Dec 65, 14p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1-3 Dec 65.

Descriptors: (*Electric cables, *Electric insulation), (*Electric wire, Electric insulation), Thermoplastics, Heat-resistant plastics, Organic sulfur compounds, Coatings, Mechanical properties, Electrical properties, Viscosity, Stability, Compatibility, Extrusion, Physical properties.

A new high-temperature thermoplastic known as polysulfone has been of considerable interest as an insulation for wire. The inherent physical properties of polysulfone indicate that as a wire insulation it would be tough, strong and abrasion resistant, with good electrical properties. Some other very important properties include vertical and horizontal flame resistance, excellent high temperature cut-through resistance, and fabrication characteristics that enable thin coatings down to 1 mil. to be placed on wire. This paper discusses the properties of a special extrusion grade polysulfone, P-2300, when used as a wire insulation.
AD-479 565 HC$3.00 MF$0.65

PROBLEMS WITH ELECTRICAL CONNECTORS AND INSULATED WIRE IN THE AEROSPACE INDUSTRY,
General Electric Co., Daytona Beach, Fla. Apollo Support Dept.
Harry S. Swan, and James M. Davis. Dec 65, 12p ASD-QA-09-65-5-Class-3
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., Dec 65.

Descriptors: (*Electric wire, Electric insulation), (*Electric connectors, Quality control), Electric cables, Design, Installation, Manufacturing methods, Reliability, Industrial training, Education, Reports, Errors, Damage, Defects (Materials), Aerospace craft, Ground support equipment, Manned spacecraft.

Three glaring problem areas in insulated wire and connectors where improvement is essential are: a. Quality programs. b. Engineering considerations. c. Assembler training.
AD-479 566 HC$3.00 MF$0.65

TAILORING OF HIGH DENSITY POLYETHYLENE FOR HIGH SPEED WIRE COATING,
Army Electronics Command, Fort Monmouth, N. J.
For primary bibliographic entry see Field 11C.
AD-479 567 HC$3.00 MF$0.65

FLAMMABILITY OF SPACECRAFT WIRE IN AN OXYGEN ATMOSPHERE,
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 22B.
AD-479 568 HC$3.00 MF$0.65

SUPERCONDUCTING HIGH VOLTAGE DELAY LINE,
Edgerton, Germershausen and Grier, Inc., Las Vegas, Nev.
A. J. Cummings, and H. Kuettner. 3 Dec 65, 31p N66-25-122
Prepared in cooperation with Hitemp Wires Co., Westbury, N. Y. Annual Wire and Cable Symposium (14th), 1-3 Dec 65, Atlantic City, N. J.

Descriptors: (*Delay lines, *Superconductors), (*Coaxial cables, Superconductors), Propagation, Electromagnetic pulses, Voltage, Niobium, Halocarbon plastics, Dielectrics, Lead, Wave transmission, Attenuation, Response.

Various types of coaxial cables with superconducting properties have been evaluated for both low voltage and high energy pulse propagation. A relationship between pulse widths and voltage levels has been observed and their effect on maximum energy propagation has been analyzed. A summary of earlier evaluations is given. A new cable construction with a pure niobium inner conductor, Teflon FEP dielectric and a thin tubular layer of high purity lead has shown superior properties as compared to the other types. Voltages up to 5KV and pulse widths up to 4 microseconds have been transmitted at 4.2K over a length of 1040 feet with a line response of approximately 0.39 nanoseconds. This is an unprecendented rise time commensurate with high voltage capabilities. The characteristic impedance throughout the line is controlled to within less than plus or minus 1% in a 50 ohm system resulting in very low reflections and less than 1/2 db signal attenuation for the 1040 foot test length including nonsuperconducting lead-ins. (Author)
AD-479 570 HC$3.00 MF$0.65

CLAD METALS IN CABLE CONSTRUCTION,
Metals and Controls, Inc., Attleboro, Mass.
For primary bibliographic entry see Field 13H.
AD-479 571 HC$3.00 MF$0.65

CONTROLLING POLYETHYLENE INSULATED WIRE CAPACITANCE,
Western Electric Co., Inc., Omaha, Neb.
A. E. Hartman. Dec 65, 16p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1-3 Dec 65.

Descriptors: (*Electric wire, Capacitance), (*Telephone lines, Electric insulation), (*Capacitance, Control), Polyethylene plastics, Thickness, Control systems, Quality control, Manufacturing methods, Electric cables, Electric bridges, Dielectric properties, Colors, Porosity, Temperature, Dies.

The need for continuous dynamic inspection of insulated wire during the tandem drawing-insulating manufacturing process resulted in the development of a wire capacitance control system. A servo-controlled bridge measures the coaxial capacitance of the moving insulated wire. Deviations in the coaxial capacitance are detected by comparing the wire capacitance during manufacture to a standard capacitance in adjacent arms of the bridge. The resulting error signal is used to automatically adjust the insulating line speed to hold the wire capacitance within specified limits. Also, the error signal is recorded to provide a continuous record of wire quality. This paper presents the principles and advantages of controlling wire capacitance and its effect on cable capacitance. (Author)
AD-479 572 HC$3.00 MF$0.65

INVESTIGATION OF METHODS TO REDUCE ANIMAL DAMAGE TO WIRE AND CABLE,
Bureau of Sport Fisheries and Wildlife, Denver, Colo. Wildlife Research Center.
James R. Tigner, and Walter A. Bowles, Jr. 1965, 5p
Annual Wire and Cable Symposium (14th), Dec 1965, Atlantic City, N. J.

Descriptors: (*Electric cables, *Damage), (*Protective treatments, Electric cables), Plastics, Communication systems, Electric wire, Rodents, Tests.

The paper investigates methods for rodent-proofing communication wire. The work remains unpublished but consisted of laboratory and field evaluation of communication wires coated with various plastics; no protective measures were developed. Welch also conducted limited investigations of damage to buried telephone cable. This work was included as part of the overall animal damage control research and was given no special emphasis. It was found that zinc dimethyldithiocarbamate cyclohexylamine complex reduced rodent attack on cables, but it did not prevent damage entirely. Stansbury tested seismograph cables treated with R-55 (tert-Butylsulfenyldimethyldithiocarbamate) in an area infested with wood rats. The rodents attacked untreated cables to a greater degree than the treated ones. (Author)
AD-479 574 HC$3.00 MF$0.65

METHOD OF JOINING PLASTIC SHEATHED CABLES WITH ELECTRIC HEATING WIRE,

Furukawa Electric Co., Ltd., Yokohama (Japan). Telecommunication Lab.
For primary bibliographic entry see Field 13H.
AD-479 575 HC$3.00 MF$0.65

EUROPA CABLE,
Societe Anonyme de Telecommunications, Paris (France).
Georges Fuchs, and Paul Verges. 3 Dec 65, 12p
Annual Wire and Cable Symposium (14th), Dec 1-3 1965, Atlantic City, N. J.

Descriptors: (*Electric cables, Electric insulation), Design, Conductivity, Telephone communication systems, Specifications, Electric insulation, Shielding, Joints, Tests, Manufacturing methods.

At the Ninth Annual Symposium on Wire and Cable an original process of insulating conductors for coaxial and balanced cables was presented. The type of insulation obtained with this method is usually referred to as S.A.T. 'Balloon' insulation. At that stage the diameters over insulated wire were in the 0.08 - 0.4 inch range. More than 20 machines are now in operation in Europe and elsewhere mostly for production of 1.2/4.4 mm (0.04/0.17 inch) small coaxial C.C.I.T.T. type cable. Since 1960 the possibilities of the S.A.T. insulation technique were greatly expanded and we would like to describe in our paper a new development of Balloon insulation for large diameter coaxial cables up to 2 inches in size. Coaxial cables of such and even larger sizes have existed for many years but were designed for rather short distance applications. (Author)
AD-479 576 HC$3.00 MF$0.65

OCEAN WATER SENSING SYSTEM,
General Electric Co., Bridgeport, Conn. Wire and Cable Dept.
For primary bibliographic entry see Field 8J.
AD-479 577 HC$3.00 MF$0.65

'KAPTON' POLYIMIDE FILM: A THIN WALL HIGH-TEMPERATURE INSULATION FOR WIRE AND CABLE,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Film Dept.
L. L. Lewis. 3 Dec 65, 15p
Annual Wire and Cable Symposium (14th), Dec 1-3, 1965, Atlantic City, N. J.

Descriptors: (*Electric cables, Electric insulation), Toughness, Heat-resistant materials, Tensile properties, Specifications, Thickness, Wear resistance, Tables.
Identifiers: Polyimide film.

'Kapton' polyimide film, formerly called H Film, is a new high-temperature film which has an outstanding and unique combination of electrical, mechanical, thermal and chemical properties. Because of its unusual properties 'Kapton' offers the opportunity for a wide variety of new insulation constructions both by itself and in combination with other materials. It should also provide solutions to many difficult problems where present insulating materials are not satisfactory. In aircraft, missile and space vehicles weight and thinness of insulation are extremely important. Because of its toughness and unusual properties 'Kapton' can be used in much thinner sections or layers than most high-temperature insulating materials and therefore is of intense interest to engineers who are concerned with saving space and weight without sacrificing reliability and ultimate performance. High temperature, thin wall insulation of wire and cable has been one of the major uses of 'Kapton' to date. Chemically, 'Kapton' is an aromatic polyimide resulting from the reaction of pyromellitic dianhydride and an aromatic diamine. Its unusual properties are due both to its highly aromatic character and special processing conditions. (Author)
AD-479 578 HC$3.00 MF$0.65

A BASIC CONSTRUCTION FOR FLEXIBLE HIGH TEMPERATURE (1000F) INTERCONNECTING CABLE,
North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
George H. Waddy. Dec 65, 9p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1 Dec 65.

Descriptors: (*Electric cables, *Manufacturing methods), Ceramic materials, High-temperature research, Oxides, Minerals, Glass textiles, Nickel, Stainless steel, Copper, Environmental tests, Design, Filaments, Quartz, Electrical conductance, Magnesium compounds, Silicates, Moistureproofing, Space environmental conditions, Mechanical properties, Performance (Engineering), Heat-resistant materials.

This paper discusses the selection of a basic cable construction capable of continuous (10,000 hour) service in an environment combining high temperature (1000F), with hard vacuum (space) and nuclear radiation levels in excess of that normally encountered in space applications. The following five basic types of cable constructions were evaluated: Ceramic bead insulated cable with a protective metal braid or foil wrap; Mineral-oxide insulated cable with a swaged or drawn metal sheath; Braided glass fibre insulated cable contained in a swaged or drawn metal sheath; Braided glass fibre insulated cable sealed in flexible metal conduit; Braided glass fibre insulated cable with a protective metal braid or foil wrap. (Author)
AD-497 573 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF CATHODOLUMINESCENT PHOSPHOR WITH HIGH-INTENSITY ULTRAVIOLET EMISSION.
Final rept. 1 Aug 64-31 Jan 66,
National Cash Register Co Dayton Ohio Research Div
J. W. Gilliland, and F. G. Ullman. Jun 67, 143p
ECOM-00304-F
Contract DA-28-043-AMC-00304 (E)

Descriptors: (*Cathode ray tube screens, Phosphorescent materials), (*Phosphorescent materials, *Ultraviolet radiation), Electroluminescence, Emissivity, Selection, Doping, Cerium, Lead, Films, Silicates, Excitation, Sprays, Substrates, Bibliographies.

The objective of the program was to synthesize a cathodoluminescent phosphor with greatly increased ultraviolet emission efficiency in the spectral region between 350 and 400 nanometers for the purpose of writing on photochromic or Kalvar media. Twenty-nine phosphor compositions were studied in at least a preliminary manner and several of these more extensively. Relative to P-16 powder, sprayed films of calcium magnesium silicate: cerium showed an average writing efficiency on Kalvar nearly ten times greater in a demountable system. Another sprayed film phosphor, $BaZn_{1.9}Mg_{0.1}Si_2O_7$:Pb with spectral peak at about 300 nm was shown to be about ten times more efficient than P-16 powder in writing on a spiropyran photochromic film in a demountable system. Demonstration cathode ray tubes were fabricated with the sprayed phosphor films, $BaSi_2O_5$:Pb, calcium magnesium silicate: cerium, and Zn_2SiO_4:Ti, and settled powder P-16 screens incorporated. Phosphors in cathode ray tubes generally were no better than presently available P-16 except for solution sprayed barium silicate: lead activated. This phosphor exhibited a relative writing efficiency four times greater than P-16 phosphor on photochromic film.
AD-657 589 HC$3.00 MF$0.65

ELECTROMAGNETIC INTERFERENCE MEASUREMENT METHODS-SHIELDED ENCLOSURE.
Georgia Inst of Tech Atlanta Engineering Experiment Station
For primary bibliographic entry see Field 20N.
AD-657 669 HC$3.00 MF$0.65

TUNNELING CURRENTS VIA AU LEVELS IN Ge ESAKI DIODES,
Illinois Univ Urbana Dept of Electrical Engineering
B. G. Streetman, and C. T. Sah. 17 Apr 67, 4p
AFOSR-67-1976
Grant AF-AFOSR-714-67
Availability: Published in Proceedings of the IEEE v55 n6 p1105-1106 Jun 1967.

Descriptors: (*Tunnel diodes, *Tunneling (Electronics)), Germanium, Doping, Gold, Interactions.

Excess currents due to two-step tunneling and Shockley-Read process in solid doped germanium alloyed pn junctions are observed, and qualitatively interpretated. (Author)
AD-657 745 Not available from CFSTI.

UHF TRANSMISSION LINE CAPABLE OF CONTINUOUS RADIATION ALONG ITS AXIS,
Furukawa Electric Co Ltd Tokyo (Japan)
For primary bibliographic entry see Field 9E.
AD-657 829 HC$3.00 MF$0.65

PRECISION HYDROPHONES FOR THE NULL STEERING ARRAY,
Scripps Institution of Oceanography San Diego Calif Marine Physical Lab
Victor C. Anderson, and W. R. Cherry. 10 May 67, 35p Rept no. SIO-Ref-67-12
Contract Nonr-2216 (05)

Descriptors: (*Hydrophones, Specifications), Measurement, Noise, Signals, Instrumentation, Test methods.

The procurement and tests of a set of 40 dB null balance hydrophones for use in null steering experiments is described. Distribution of null balance and self-noise measurements for 38 units are given. Specifications, test procedures and a description of the testing instrumentation are included. (Author)
AD-657 929 HC$3.00 MF$0.65

RADIAL LINE STUBS AS ELEMENTS IN STRIP-LINE CIRCUITS,
Lockheed Missiles and Space Co Sunnyvale Calif Electronics Div
Jorgen P. Vinding. 1967, 14p Rept no. LMSC/808981

Descriptors: (*Strip transmission lines, Electrical impedance), Resistors, Low-pass filters, Admittance, Attenuation.

It is shown that radial line stubs are attractive as shunt elements in strip line circuits because very low input impedance can be obtained over a large frequency range and with a well defined 'point' of contact. This well defined point of contact also prevents excitation of transverse modes which could be supported in some part of the stub. To illustrate the use of such stubs, a low pass filter with a cut-off frequency of 3.54 GHz has been designed with uniform line series elements and radial line shunt elements. The filter shows essentially the predicted pass band characteristic, but the stop band has been displaced towards lower frequencies and a spurious response is found around 8.8 GHz. The displacement is found to be caused by fringing capacitance at the end of each stub and the spurious response is believed to be due to insufficient ground plane interconnection. (Author)
AD-657 952 HC$3.00 MF$0.65

HARMONIC COMMUTATION APPLIED TO AN EXPERIMENTAL STATIC INVERTOR AND ITS APPLICATION TO BRUSHLESS D.C. MOTORS.

Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 9C.
AD-657 988 HC$3.00 MF$0.65

ACTIVE RC DELAY NETWORKS USING OPERATIONAL AMPLIFIERS.
New York Univ N Y Lab for Electroscience Research
For primary bibliographic entry see Field 9E.
AD-658 020 HC$3.00 MF$0.65

RESEARCH IN FERROMAGNETICS, PART II.
Laboratory for Electronics Inc Boston Mass Electronics Div
For primary bibliographic entry see Field 9B.
AD-658 046 HC$3.00 MF$0.65

STUDIES OF GUIDED ELECTROMAGNETIC WAVES IN THE PRESENCE OF AXIALLY NONUNIFORM OR RANDOM PERTURBATIONS,
Columbia Univ New York Dept of Electrical Engineering
For primary bibliographic entry see Field 20N.
AD-658 056 HC$3.00 MF$0.65

HIGH-POWER, FOUR-PORT JUNCTION CIRCULATOR.
Technical rept.,
Army Electronics Command Fort Monmouth N J
John L. Carter, and John J. Bruscella. May 67, 18p Rept no. ECOM-2841

Descriptors: (*Waveguide circulators, Power), X band, Dielectric properties, Gadolinium, Ferromagnetic materials, Geometry, Circuits, Instrumentation.

The high-power limitations of four-port junction waveguide circulators are investigated. The optimum geometry and dielectric loading are determined. The major limitation is found to be high-power breakdown. An X-band, four-port junction circulator, capable of operating at a peak power of 150 kW at a center frequency of 9.0 GHz, is described. Isolation is found to be 15 db minimum and insertion loss less than 1 db over a frequency range of 250 MHz. The best material to inhibit ferromagnetic nonlinear effects was found to be YIG, with 45% gadolinium substitution. (Author)
AD-658 059 HC$3.00 MF$0.65

STUDY OF METHODS TO IMPROVE HIGH POWER KLYSTRON LIFE AND RELIABILITY.
Quarterly progress rept. no. 2, 1 Apr-30 Jun 67,
Varian Associates Palo Alto Calif
John Brookshier. 30 Jun 67, 25p Rept no. 346-2Q
Contract DAAB07-67-C-0228
See also AD-654 779.

Descriptors: (*Klystrons, Reliability (Electronics)), Life expectancy, Electron tube parts, Cathodes (Electron tubes), Electron tube heaters, Filaments, Waveguide windows.

Studies were conducted in the following areas. (1) Filament Studies: The cycling test on three filaments under dc conditions at rated power was completed; Bell jar tests at 20% excess power were completed; Tests are continuing on seven diodes (three with ac on heaters and four with dc on heaters); Six new testers with modified cathode structures will be placed on the test rack. (2) Window Studies: The test setup for studying arcs was completed, including the arc generator and arc protection circuits; A number of tests were made on two half-wave thick block windows to determine the effect of arcs striking the window; One window was tested to destruction. (Author)
AD-658 077 HC$3.00 MF$0.65

STUDY OF TRANSVERSE WAVE INTERACTIONS.
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
For primary bibliographic entry see Field 20N.
AD-658 084 HC$3.00 MF$0.65

A DYNAMIC METHOD FOR MEASURING THE LOW FREQUENCY HYBRID PARAMETERS OF JUNCTION TRANSISTORS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. F. Jenkins, Jr., and D. N. Qualkinbush. 6 May 54, 25p Rept no. CF-2212

Descriptors: (*Transistors, Performance (Engineering)), Measurement, Theory, Measuring devices (Electrical + electronic), Electrical impedance, Electrical properties, Circuits.

Contents: Theory; Design of the dynamic h meter; Construction of the dynamic h meter; Specific operating instructions; Other uses.
AD-658 135 HC$3.00 MF$0.65

A HYBRID PARAMETER REPRESENTATION FOR TETRODE TRANSISTORS. PART I. THEORETICAL CONSIDERATIONS OF THE CHARACTERISTICS OF TETRODE TRANSISTORS. PART II. USE OF THE TETRODE HYBRID PARAMETERS IN THE SOLUTION OF CIRCUIT PROBLEMS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. F. Jenkins, Jr., and J. B. Oakes. 27 Jul 54, 21p Rept no. CF-2242
Contract NOrd-7386

Descriptors: (*Transistors, Tetrodes), Theory, Matrix algebra, Voltage, Gain, Circuits, Mathematical analysis.

A 3 x 3 matrix representation for the tetrode transistor involving hybrid parameters has been devised which allows easy and accurate calculations of the behavior of the tetrode in any possible circuit configuration. The close agreement between the calculated and measured behavior serves not only to prove the validity of the representation, but also to indicate the accuracy and ease with which the individual hybrid parameters may be measured. (Author)
AD-658 137 HC$3.00 MF$0.65

MEASUREMENT OF TRANSISTOR HYBRID PARAMETERS AS A FUNCTION OF FREQUENCY,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. B. Oakes. 25 May 54, 16p Rept no. CF-2213

Descriptors: (*Transistors, Performance (Engineering)), Measurement, Electrical impedance, Gain, Voltage, Electrical properties, Circuits.

Reasonably accurate measurements of the h parameters for junction transistors can be made up to frequencies of several megacycles if precautions are taken to reduce stray capacity and circuit noise. With the information thus obtained, analytic expressions for the h parameters can be found which will allow the accurate design of high frequency transistor circuits. (Author)
AD-658 138 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTI-1 SATURABLE REACTOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 7p Rept no. CF-1895
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Saturable reactors, Quality control), Airborne, Performance (Engineering), Test methods, Specifications, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, tests, and tagging.
AD-658 142 HC$3.00 MF$0.65

STUDY OF CROSSED-FIELD AMPLIFIERS.
California Univ Berkeley Electronics Research Lab
For primary bibliographic entry see Field 9E.
AD-658 200 HC$3.00 MF$0.65

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Microwave Electronics Palo Alto Calif
For primary bibliographic entry see Field 9E.
AD-658 202 HC$3.00 MF$0.65

PRACTICAL CONSEQUENCES OF MODAL PARAMETER CONTROL IN CRYSTAL RESONATORS,
Technical rept.,
Army Electronics Command Fort Monmouth N J
Gunter K. Guttwein, Theodore J. Lukaszek, and Arthur D. Ballato. Jun 67, 28p Rept no. ECOM-2847

Descriptors: (*Resonators, Crystals), Crystal filters, Crystal oscillators, Very high frequency, Performance (Engineering), Quartz, Quartz resonators, Radio equipment, Attenuation, Vibration, Frequency synthesizers, Internal friction.

The extension of the design technique to permit the fabrication of units to 150 MHz is presented along with a discussion of the latitude which exists between the conflicting constraints imposed by the nature of the crystal element. Included are charts and nomograms to facilitate the design of these units, together with attainable motional parameter values consistent with an adequately suppressed unwanted mode spectrum. This new technology is also applicable to oscillator crystals. One area explored concerns the specific problem of achieving moderate mode suppression in VHF oscillator crystals which must work in fixed-tuned circuits. Here the operating characteristics of the oscillator are such that the use of conventional designs in the crystal fabrication results in poor equipment performance. The difficulties are resolved by using energy-trapped elliptical electrodes. Not only are the original motional resistance and capacitance values preserved, but all troublesome modes are suppressed by more than 8 dB; these units perform well in the equipment. The report concludes with a discussion of certain inherent boundaries on resonator design and performance arising from intrinsic properties of quartz and vibrator configuration. Based on the Bommel, Mason, and Warner curves these boundaries are related to practical frequency ranges, orders of overtone, and values of attainable Q, including Q enhancement by mode trapping and control. (Author)
AD-658 222 HC$3.00 MF$0.65

MAGNETOSTRICTIVE DELAY LINE MEMORY FOR TRANSIT 4A,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9B.
AD-658 374 HC$3.00 MF$0.65

HIGH FREQUENCY TRANSISTOR EVALUATION,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
T. Thompson. 1 May 61, 62p Rept no. CF-2932
Contract NOrd-7386

Descriptors: (*Transistors, High frequency), Computer programs, Design, Performance (Engineering).

The report is primarily concerned with describing a computer program designed for evaluation of high frequency transistors. Particular emphasis has been placed on describing the use of this program for high frequency transistor circuit design. The analytical approach uses the properties of two ports for evaluation and design. Therefore, with respect to design, the program is limited to linear narrow band circuits. Aside from actual circuit design the information obtained is quite useful for making transistor comparisons. The program allows for study of parameter variations from one transistor to another, of a given type, and also for the study of parameter variation with bias condition. Samples of the computer input and output data are included along with several examples of circuit design from the computer output. (Author)
AD-658 378 HC$3.00 MF$0.65

BOEING-SPONSORED COMPANION STUDIES OF SHIELDING TECHNIQUES.
Final supplementary rept. no. 3, 4 Jun 63-30 Mar 66,
Boeing Co., Renton, Wash. Airplane Div.
J. G. Harrington, R. Goldman, and R. B. Schulz.
Jan 67, 145p Rept. no. D6-2043-2
ECOM-02308F
Contract DA-36-039-AMC-02308- (E)

Descriptors: (*Electromagnetic shielding, Laminates), Metal plates, Weight, Density, Thickness, Cladding, Attenuation, Copper, Steel, Zinc, Aluminum, Titanium, Tin.

The principal purpose of this report is to establish a set of criteria for the design of an optimum shield with respect to the weight parameter. The optimum shield may be the lightest weight shield that provides a desired level of attenuation or one that affords maximum shielding effectiveness within a specified weight limit. The study was restricted to three-layer or laminated shields of two different materials. The outer or cladding layers were of the same material and thickness. This configuration is a practical one with respect to application, and its symmetry simplifies calculations. Various combinations of ferromagnetic and nonmagnetic materials were investigated for broad spectrum attenuation. A minimum of laboratory investigation was conducted; the main portion of the study consisted of computer analyses of the postulated shields. A computer program was written to perform the parametric study of the different types of shields. Graphs summarizing the results of computer analyses are given, as well as an introductory discussion of the general laminated case or N-layer shield problem.
AD-801 258 HC$3.00 MF$0.65

ENERGY STORAGE CAPACITORS.
Impulskondensatoren
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
R.-C. Kunze. Apr 67, 21p IPP-4/35
in German, English Summary

Descriptors: *Capacitor, *Flaw, *Lifetime, Current, Defect, Electric, Electronic, Equipment, Impulse, Pinch, Plasma, Property, Theta.

For abstract, see STAR 05 20.
N67-34192 HC$3.00 MF$0.65

A NEW TYPE OF CAVITY RESONATOR.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy).
M. Puglisi, and F. Tazzioli. 10 Apr 67, 23p LNF-67/29
Its Nota Interna 361

Descriptors: *Cavity resonator, *Resonant cavity, Accelerator, Application, Cavity, Circuit, Coaxial, Concept, Corrugation, Design, Electric, Element, Field, Free, Frequency, Geometry, Impedance, Line, Load, Particle, Radial, Resonance, Resonator, Superconductivity.

For abstract, see STAR 05 20.
N67-34725 HC$3.00 MF$0.65

RESEARCH FOR DEVELOPMENT OF THIN-FILM SPACE CHARGE LIMITED TRIODE DEVICES.
Hughes Aircraft Co., Newport Beach, Calif. Applied Solid State Research Dept.
K. G. Aubuchon, P. Knoll, and R. Zuleeg. May 67, 77p NASA-CR-87492
Contract NAS12-144

Descriptors: *Sapphire, *Silicon transistor, *Space charge, *Triode, Aluminum, Charge, Crystal, Deposition, Development, Device, Film, Oxide, Pyrolysis, Quartz, Semiconductor, Silicon, Space, Substrate, Transistor, Wafer.

For abstract, see STAR 05 20.
N67-34894 HC$3.00 MF$0.65

SIMULATED SHUNT CAPACITOR SWITCHING TESTS PINNACLE PEAK SUBSTATION, COLORADO RIVER STORAGE PROJECT, MAY 16-21, 1966.
Bureau of Reclamation, Denver, Colo. Electric Power Branch.
For primary bibliographic entry see Field 10B.
PB-175 607 HC$3.00 MF$0.65

9B. Computers

ON INCIDENCE MATRICES,
Michigan State Univ East Lansing Dept of Statistics
For primary bibliographic entry see Field 12A.
AD-657 611 HC$3.00 MF$0.65

COMPUTER ANALYSIS OF PROTECTIVE STRUCTURES FOR PROTECTION FROM NUCLEAR BLAST.
Lin (T Y) and Associates Van Nuys Calif
For primary bibliographic entry see Field 19D.
AD-657 612 HC$3.00 MF$0.65

EQUATIONS AND PROGRAMS FOR THE USE OF LOW COST DIGITAL COMPUTING EQUIPMENT IN AERODYNAMIC DESIGN SYNTHESIS AND ANALYSIS OF GENERAL AVIATION AIRCRAFT CONFIGURATIONS.
Dodco Inc Blawenburg N J
For primary bibliographic entry see Field 1C.
AD-657 627 Not available from CFSTI.

WHAT IS A SATISFACTORY QUADRATIC EQUATION SOLVER.
Stanford Univ Calif Dept of Computer Science
For primary bibliographic entry see Field 12A.
AD-657 639 HC$3.00 MF$0.65

GRAPHICAL-DATA-PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION.
Quarterly rept. no. 5, 1 Feb-31 May 67,
Stanford Research Inst Menlo Park Calif
Richard O. Duda, and John H. Munson. Jun 67, 104p Rept no. 27
ECOM-01901-27
Contract DA-28-043-AMC-01901 (E)
Continuation of Contract DA-36-039-AMC-03247 (E). See also AD-650 926.

Descriptors: (*Pattern recognition, Graphics), (*Data processing systems, *Graphics), Learning machines, Classification, Programming languages, Syntax, Analysis, Dynamic programming, Character recognition.
Identifiers: FORTRAN.

The report describes the continuing development of preprocessing, character-classification, and context-analysis techniques for hand-printed text, such as computer coding sheets in the FORTRAN language. We discuss preprocessing operations developed to find topological features such as the perimeter, the convex hull, concavities, enclosures, and spurs of a black/white quantized figure. We describe the present status of a program, TOPO 2, which classifies characters on the basis of these and other topological features. Finally, we detail the component functions of the LISP program developed to perform FORTRAN syntax analysis on a statement-by-statement basis. (Author)
AD-657 670 HC$3.00 MF$0.65

COMPOSITION, COPYING, AND SEMI-MECHANIZED FILING AND SEARCHING DEVICES,
Herner and Co Washington D C
For primary bibliographic entry see Field 5B.
AD-657 734 Not available from CFSTI.

ON THE STRUCTURE OF SEQUENTIAL MACHINE REALIZATIONS.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Charles A. Harlow, and Clarence L. Coates. 19 Jul 67, 81p Rept no. TR-27
AFOSR-67-1764
Grant AF-AFOSR-766-67, Contract NSF-GP-2724
Research supported in part by NASA grant NGR-44-012-449.

Descriptors: (*Automata, Relaxation oscillators), Computer storage devices, Delay circuits, Synchronization (Electronics), Feedback, Theorems.
Identifiers: Sequential machines.

In most studies of the structure of sequential machines there has been a tacit assumption that the machine was to be realized with unit delay memory elements. In this report we consider sequential machines that are realized with either trigger or set-reset flip-flop memory elements. It is shown that the relation called a partition pair which predicts the dependence of the input functions to unit delay memory elements does not predict the dependence of the input functions to trigger or set-reset flip-flop memory elements. In this paper we define relations called t-pairs and r-pairs which characterize the dependence of the input functions to trigger and set-reset flip-flop memory elements respectively. It is found that these relations do not have all the algebraic properties that partition pairs possess. Feedback in sequential machines that are realized with trigger or set-reset flip-flop memory elements is also studied. A method is given for determining when a machine can be realized with either trigger or set-reset flip-flop memory elements using function f for feedback. It is shown that if a sequential machine can be realized with unit delay memory elements using a function f for feedback then it can be realized with set-reset flip-flops using f for feedback. It is also shown that for completely specified machines that if a machine can be realized without feedback using unit delay memory elements then it cannot be realized without feedback using trigger flip-flop memory elements. The converse statement is also true. (Author)
AD-657 757 HC$3.00 MF$0.65

UNSUPERVISED LEARNING, MINIMUM RISK ADAPTIVE PATTERN CLASSIFICATION.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Charles G. Hilborn, Jr., and Demetrios G. Lainiotis. 16 Aug 67, 63p Rept no. TR-37
AFOSR-67-1889
Grants AF-AFOSR-766-66, AF-AFOSR-766-67

Descriptors: (*Pattern recognition, Adaptive systems), (*Learning machines, Adaptive systems), (*Decision theory, Statistical processes), (*Information theory, Mathematical models), Random variables, Optimization, Stability, Learning.
Identifiers: Sequential pattern recognition.

A recursive Bayes optimal solution is found for the problem of sequential, multicategory pattern recognition, when unsupervised learning is required. The parametric model used for this investigation allows for (i) both constant and time-varying unknown parameter vectors, (ii) partially unknown probability laws of the hypotheses and time-varying parameters, (iii) dependence of observations of finite past as well as present hypotheses and parameters, and, most significantly, (iv) parameter-conditional dependence of both observations and the information source up to any finite Markov orders. For finite or quantized parameter spaces the optimal (minimum risk) learning system is found and shown to be realizable in recursive form with finite memory requirements. By a matrix formulation, the system is represented as a combination of delay-feedback dynamic systems. The asymptotic properties of the optimal solution are studied, and it is shown that as a result of the martingale nature of the learning sequences, the optimal system is asymptotically stable and convergent. As an illustration of the applicability of the results, the general formulation is shown to be directly applicable to the construction of optimum unsupervised learning m-ary communication receivers in the presence of such problems as lack of symbol synchronization, intersymbol interference, correlated noise, random channel parameters, unknown signal waveforms and statistically dependent symbols. (Author)
AD-657 759 HC$3.00 MF$0.65

MINIMIZATION OF BOOLEAN FUNCTIONS CONTAINING ARBITRARY PARAMETERS.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Kenneth E. Kirsch, and Charles H. Roth, Jr. 21 Aug 67, 76p Rept no. TR-38
AFOSR-67-1891
Grant AF-AFOSR-766-67

Descriptors: (*Special functions (Mathematical), Optimization), (*Computer logic, Special functions (Mathematical)), Relaxation oscillators, Iterative methods, Design, Mathematical analysis.

Design of flip-flop input networks, realization of incompletely specified state tables, design of asynchronous sequential networks, state assignment, and other logic design problems can lead to Boolean functions which contain arbitrary parameters. These parameters are a generalization of don't care conditions and may be assigned arbitrary values so as to minimize the cost of realizing the functions. A modification of the Quine-McCluskey procedure permits minimization of arbitrary parameter functions. A prime implicant list is developed in terms of the parameters and is used to derive a conditional prime implicant chart. Minimum solutions are obtained from this chart by a modified Petrick method or by branching. A second method for minimizing arbitrary-parameter functions treats a function of m parameters and n variables as an (m+n)-variable function. The prime implicants of this function are derived by iterated consensus and then modified to obtain the conditional prime implicant chart. Both methods have been generalized to the multiple-output case. (Author)
AD-657 760 HC$3.00 MF$0.65

COMPUTER TECHNOLOGY.
Library of Congress Washington D C Aerospace Technology Div
31 Aug 67, 31p Rept no. ATD-67-43
TT-67-62790
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Computers, Reports), Control systems, Transistors, Circuits, Microwaves, Data storage systems, Magneto-optic effect, Tunnel diodes, Fiber optics, Magnetic cores, USSR.

The paper is the tenth in a series of reports reviewing Soviet developments in computer technology. Abstracts contained in the report were selected from Soviet open-source literature recently available at the Aerospace Technology Division and the Library of Congress. Information not directly related to the assigned subject has been included because of its broad implications for study in this field. The 18 abstracts are arranged alphabetically by author within each of the following categories: components, applications, and associated systems. A bibliography is presented at the end of the report. (Author)
AD-657 770 HC$3.00 MF$0.65

BULK CORE IN A 360/67 TIME-SHARING SYSTEM,
Carnegie Inst of Tech Pittsburgh Pa Dept of Computer Science
Hugh C. Lauer. 1967, 34p
AFOSR-67-1968
Contract SD-146

Descriptors: (*Computer storage devices, *Time sharing), Magnetic core storage, Models (Simulations), Stochastic processes, Random variables, Mathematical analysis.
Identifiers: On-line systems, Magnetic drum storage.

In time-sharing systems where programs and data move frequently between storage media, performance measured in terms of response time, availability, capacity, and generality depends on the ability of the system to move information quickly and promptly upon demand. Analysis of and early experiences with TSS/360 reveal that a drum-oriented system cannot meet the demands imposed by user tasks. Consequently, Carnegie Institute of Technology has replaced the drum on its 360/67 with Large Capacity Core Storage. A model of the drum system was constructed, and it was discovered that it could not support its maximum paging rate except under conditions which impose high system costs. It was also found that because of its rotating nature, it actually withdraws significant portions of memory from the usable main memory of the system. Bulk core, when operated with a simple core-to-core channel, has neither of these faults. It provides the added advantage that not all pages need be swapped--those which are not heavily used may be referenced directly by the CP. By operating selectively in both modes we expect nearly an order of magnitude better performance than is possible with a drum. (Author)
AD-657 782 HC$3.00 MF$0.65

TOWARD ECONOMICAL REMOTE COMPUTER ACCESS,
Carnegie Inst of Tech Pittsburgh Pa Dept of Computer Science
Michael M. Gold, and Lee L. Selwyn. Jul 67, 18p
AFOSR-67-2018
Contracts SD-146, Nonr-4102 (01)

Descriptors: (*Computers, *Remote control systems), (*Time sharing, Economics), (*Communication systems, Time sharing), Costs, Teletype systems, Telephone communication systems, Efficiency.
Identifiers: On-line systems.

The communications services available to a user remotely accessing a time-shared computer system are considered in light of the requirements of such usage. While time-shared systems are designed to provide the computer user with the opportunity to work at his most advantageous speed and interact with the computer at his convenience, available communications services have not as yet been designed for efficient and economic time-sharing computer usage. A plan is suggested which would share communication facilities among many users; each user accessing the facility for brief periods of time. Although present technology would allow a group of users to construct a shared-carrier operation by leasing conventional circuits from the common carriers, it is suggested that the common carriers offer a sharing service, charging for communications by the amount of information transmitted rather than the time the circuit is open. Unless such a system is implemented, the full economic advantages of time-sharing cannot be attained. (Author)
AD-657 783 HC$3.00 MF$0.65

COST REPORTING FOR DEVELOPMENT OF INFORMATION PROCESSING SYSTEMS,
System Development Corp Santa Monica Calif
Edward A. Nelson, and Thomas Fleishman. 11 Apr 67, 83p Rept no. TM-3411
ESD-TR-67-452
Contract F19628-67-C-0132

Descriptors: (*Computer programs, *Costs), (*Data processing systems, Computer programs), Operators (Personnel), Systems engineering, Programming (Computers), Department of Defense, Management control systems, Organizations, Management planning, Management engineering, Computer personnel.

The report describes a system for the collecting and reporting on data on the resources expended in the production of computer programs. The system is intended to: (1) provide information to facilitate management control during the progress of a computer programming effort; (2) build a data bank from which better cost-estimating relationships and planning tools can be developed; (3) accomplish the above with a minimum of interference with operating personnel. The report was designed to provide sample materials necessary for the implementation of cost reporting in any organization in which computer programming is performed; it includes a description of the steps that constitute the computer programming process, the kinds of personnel who would be involved in the cost-collection and -reporting system, a recommended work flow and suggested forms for use in data collection and reporting, a work breakdown structure for associating costs with activities, and a brief discussion of the relationship of this system with several existing Department of Defense management procedures.
AD-657 793 HC$3.00 MF$0.65

CYBERNETICS AND EDUCATION,
System Research Ltd Richmond (England)
For primary bibliographic entry see Field 5I.
AD-657 806 HC$3.00 MF$0.65

OBSERVATION SYSTEM BIAS ESTIMATION FROM SATELLITE OBSERVATIONS: DIGITAL COMPUTER PROGRAM.
Martin Co Baltimore Md
For primary bibliographic entry see Field 22C.
AD-657 811 HC$3.00 MF$0.65

THE COMPUTER--HERO OR VILLAIN,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5H.
AD-657 812 Not available from CFSTI.

AN ANALOG COMPUTER FOR PREDICTING SURFACE TEMPERATURES OF WOOD.
Forest Products Lab Madison Wis
For primary bibliographic entry see Field 11L.
AD-657 819 HC$3.00 MF$0.65

THE USE OF AN ON-LINE DIGITAL COMPUTER IN CLOSED-LOOP HIGH-ENERGY PHYSICS EXPERIMENTS,
Stanford Univ Calif High Energy Physics Lab
For primary bibliographic entry see Field 20H.
AD-657 977 Not available from CFSTI.

COMPUTER PROGRAMS DEALING WITH FINITE-STATE MACHINES: PART I.
Technical rept.,
Michigan Univ Ann Arbor Systems Engineering Lab
Thomas F. Piatkowski. May 67, 41p Rept no. SEL-TR-11, 06920-9-T
Contract AF 30 (602)-3546

Descriptors: (*Computer programs, *Automata), Simulation, Mapping (Transformations), Time sharing, Algorithms, Flow charting.
Identifiers: Finite-state machines.

A number of algorithms were programmed dealing with finite-state machines; the purposes of this effort being: (1) pedagogical application, (2) the stimulation of insight, and (3) the generation of new questions and approaches. Out of a set of thirty-eight more or less different problems dealing with finite state machines, seven representatives were selected; namely: (1) simulate a given machine, (2) determine if a given machine is strongly connected, (3) determine the state equivalence classes and minimal form for a given machine, (4) determine the automorphisms and their group for a given machine, (5) determine a shortest simple adaptive diagnosing experiment for a given machine and admissible set, (6) determine an equivalent regular expression for a given machine, (7) exhibit the lattice of SP partitions for a given machine. This report, the first of two, describes the programs treating problems one through four, a second report treating problems five through seven is contained in AD-658 001.
AD-657 999 HC$3.00 MF$0.65

ON THE CONSTRUCTION OF THE LATTICE OF SP PARTITIONS.
Technical rept.,
Michigan Univ Ann Arbor Systems Engineering Lab
Thomas F. Piatkowski. Jul 67, 12p Rept no. SEL-TR-18, 06920-14-T
Contract AF 30 (602)-3546

Descriptors: (*Automata, Mathematical analysis), Graphics, Mapping (Transformations), Operators (Mathematics).
Identifiers: Finite state machines.

The report presents a method for constructing the lattice of SP partitions for any given finite-state machine via a state-pair graph constructed directly from the machine's transition function and a homomorphism which reduces a set of subgraphs to the full SP partition lattice for the machine. The method is a graphical extension of the two-state generator procedure of Hartmanis and Stearns.
AD-658 000 HC$3.00 MF$0.65

COMPUTER PROGRAMS DEALING WITH FINITE-STATE MACHINES: PART II.
Technical rept.,
Michigan Univ Ann Arbor Systems Engineering Lab
Thomas F. Piatkowski. Jul 67, 76p Rept no. SEL-TR-20, 06920-15-T
Contract AF 30 (602)-3546

Descriptors: (*Computer programs, *Automata), Time sharing, Adaptive systems, Mapping (Transformations), Algorithms, Flow charting.
Identifiers: Finite-state machines.

A number of algorithms were programmed, dealing with finite-state machines; the purposes of this effort being: (1) pedagogical application, (2) the stimulation of insight, and (3) the generation of new questions and approaches. Out of a set of thirty-eight more or less different problems dealing with finite state machines, seven representatives were selected; namely: (1) simulate a given machine, (2) determine if a given machine is strongly connected, (3) determine the state equivalence classes and minimal form for a given machine, (4) determine the automorphisms and their group for a given machine, (5) determine a shortest simple adaptive diagnosing experiment for a given machine and admissible set, (6) determine an equivalent regular expression for a given machine, (7) exhibit the lattice of SP partitions for a given machine. This report, the second of two, describes the programs treating problems five through seven; the first report treating problems one through four appeared previously as AD-657 999.
AD-658 001 HC$3.00 MF$0.65

COMPILER GENERATION USING FORMAL SPECIFICATION OF PROCEDURE-ORIENTED AND MACHINE LANGUAGES.
Technical rept.,
Rome Air Development Center Griffis AFB NY
William G. McLellan, and Philip Gilbert. Aug 67, 27p Rept no. RADC-TR-67-454

Descriptors: (*Compilers, *Programming languages), Syntax, Grammars, Coding, Symbols.
Identifiers: ALGOL, FORTRAN, JOVIAL.

A compiler generation system is described which is rigorously based and which allows formal specification both of the source (procedure oriented) languages and of the object (machine oriented) languages. An intermediate or 'buffer' language, BASE, is interposed, reducing the required transformation techniques described. The system, so far, includes those elements in BASE necessary to produce ALGOL, FORTRAN, and JOVIAL compilers. This paper was presented at the 1967 Spring Joint Computer Conference. (Author)
AD-658 029 HC$3.00 MF$0.65

A DATA DEFINITION FACILITY FOR PROGRAMMING LANGUAGES.
Doctoral thesis,
Carnegie Inst of Tech Pittsburgh Pa Dept of Computer Science
T. A. Standish. 18 May 67, 300p
AFOSR-67-2045
Contract SD-146

Descriptors: (*Programming languages, Theses), (*Programming (Computers), Algorithms), Digital computers, Complex variables, Flow charting, Problem solving, Syntax, Semantics, Mapping (Transformations).

The dissertation presents a descriptive notation for data structures which is embedded in a programming language in such a way that the resulting language behaves as a synthetic tool for describing data and processes in a number of application areas. A series of examples including formulae, lists, flow charts, Algol text, files, matrices, organic molecules and complex variables is presented to explore the use of this tool. In addition, a small formal treatment is given dealing with the equivalence of evaluators and their data structures.
AD-658 042 HC$3.00 MF$0.65

RESEARCH IN FERROMAGNETICS, PART II.
Final rept. (Item 2), Apr 65-Mar 66,
Laboratory for Electronics Inc Boston Mass Electronics Div
Robert J. Spain, Claude P. Battarel, Harvey I. Jauvtis, Michael J. Marino, and Patrick J. Peoples.
Sep 67, 109p
AFCRL-67-0205-Rev
Contract AF 19 (628)-4197
Supersedes AD-655 059, Final rept. See also Part 1, AD-654 681.

Descriptors: (*Ferromagnetic materials, Films), (*Computer storage devices, Films), Magnetic properties, Thin film storage devices, Shift registers, Feasibility studies, Computer logic, Logic circuits.

Work has been carried out on ascertaining the feasibility of a DTPL Push Down List Memory. Investigations were made of the basic PUDL thin film shift register structure as well as the associated conductor patterns. Drive and sense electronics have been designed and breadboarded and a number of system designs have been studied and evaluated. Additional work is still required for the optimization of the thin film elements and for the completion of the feasibility model. (Author)
AD-658 046 HC$3.00 MF$0.65

SIMPLIFIED AUTOMATIC DATA PLOTTER FOR FM/FM TELEMETER SYSTEMS 'SADAP',
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14C.
AD-658 086 HC$3.00 MF$0.65

A METHOD FOR COATING MADDIDA MAGNETIC MEMORY DRUMS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 11C.
AD-658 092 HC$3.00 MF$0.65

A PROGRAM TO COMPUTE BETA RADIATION DOSAGE. VOLUME I. PROGRAM DESCRIPTION.
American Research Corp Fullerton Calif
For primary bibliographic entry see Field 18H.
AD-658 108 HC$3.00 MF$0.65

A PROGRAM TO COMPUTE BETA RADIATION DOSAGE. VOLUME II. USER'S MANUAL AND PROGRAM LISTINGS.
American Research Corp Fullerton Calif
For primary bibliographic entry see Field 18H.
AD-658 110 HC$3.00 MF$0.65

COORDINATE READER AND CARD PUNCH OR TABULATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Richard H. VanHaagen. 10 Sep 54, 19p Rept no. CF-2275
Contract NOrd-7386

Descriptors: (*Film readers, *Data processing systems), Operation, Maintenance, Punched cards.

The equipment was designed to be used in either of two modes as dictated by the requirements of the information which is to be transcribed. The first mode is one of reading relative values of coordinates which are randomly or otherwise scattered about, such as particles in a fluid. The positions of the particles may change as a function of time, and the successive readings will show their behavior and can be mathematically analyzed. This may be recorded on a number of successive single-exposure frames of a photographic film, or on one frame with successive exposures. In each of these

cases both coordinate values are unknown. In the second mode, readings are made at prescribed intervals along one axis, such as in the conversion of strip-chart records and oscillograph records to punched cards, where equal steps along one (usually the horizontal) axis are desired; the position of the other coordinate being the intersection of the first one and the recorded trace. Initial read-out of calibration traces allows an interpolation by machine calculation which produces linearized data.
AD-658 131 HC$3.00 MF$0.65

MANUAL OF DATA PROCESSING STANDARDS.
Defense Intelligence Agency Washington D C
15 Sep 66, 450p Rept no. DIAM-65-11

Descriptors: (*Data processing systems, Standards), (*Management planning, Data processing systems), Department of Defense, Design, Analysis, Computer personnel, Training, Performance (Engineering), Performance (Human), Flow charting, Maintenance, Programming (Computers), Computer logic, Coding, Documentation.
Identifiers: Systems analysis, Defense Intelligence Agency.

The purpose of the Defense Intelligence Agency Manual of Data Processing Standards is to provide guidance, to establish standard methods and procedures for analysis, design, programming and operation of the Automatic Data Processing Systems (ADPS) Center, to define personnel and equipment performance standards and methods of control and evaluation of performance standards to insure maximum utilization of the ADPS Center's resources. (Author)
AD-658 158 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Technical note,
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
J. Garcia Santesmases. 31 Jul 60, 115p Rept no. TN-3
Contract AF 61 (514)-1234

Descriptors: (*Computers, *Magnetic resonance), (*Control systems, Magnetic resonance), (*Electrical networks, Magnetic resonance), Bibliographies, Varactor diodes, Inductance, Computer logic, Inverter circuits, Logic circuits, Shift registers, Relaxation oscillators.

In chapter 1 the list of bibliography given in the two previous Technical Notes has been extended up to seventy nine papers. In this list a new group of papers corresponding to the use of variable capacitance diodes in non-linear resonant circuits, has been made up. Chapter 2 deals on the ferroresonant circuits developed. Some new systems to obtain the transfer of information between ferroresonant elements in which demodulation of A.C. signals is not needed have been described. A consequence is the elimination of the control winding on the inductor cores. Each of these systems allow one to develop a system of circuit logic. In chapter 3, the work performed on the variable capacitance diode nonlinear resonant circuit is described.
AD-658 189 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Rept. for 1 Apr 58-31 Mar 59,
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
J. Garcia Santesmases. 30 Apr 59, 184p Rept no. TN-2
Contract AF 61 (514)-1234
See also AD-658 217 and AD-658 189.

Descriptors: (*Computers, *Magnetic resonance), (*Control systems, Magnetic resonance), (*Electrical networks, Magnetic resonance), Relaxation oscillators, Magnetic core storage, Logic circuits, Shift registers, Inductance, Computer logic, Delay circuits, Magnetic properties, Bibliographies.

In chapter 1 the list of bibliography on ferroresonance given in Technical Note No. 1 has been extended to sixty-five papers. Chapter 2 is devoted to the tests carried out on ferrite materials, the reduction of the size of cores, and the obtention of shapes more convenient for use in ferroresonance at frequencies up to ten megacycles. In chapter 3 the ferroresonant devices are described. With the series circuit without polarization as a basis, complete systems of circuit logic have been developed. The delay unit, the half-adder, a serial full adder, and some other circuits which make use of the operating principles of the delay unit and half-adder, are described. The experimental results presented have been obtained with a carrier frequency of two megacycles, and pulse repetition rates ranging between 200.000 and 300.000 pulses per second.
AD-658 190 HC$3.00 MF$0.65

COMPUTER COMPILER ORGANIZATION STUDIES.
Final rept. 15 May 66-15 May 67,
Morrissey (John) Associates Inc New York
R. Barbieri, and J. Morrissey. 15 May 67, 121p
AFCRL-67-0483
Contract AF 19 (628)-5918

Descriptors: (*Compilers, Systems engineering), Coding, Efficiency, Time sharing, Costs, Man-machine systems, Programming (Computers), Programming languages, Syntax, Flow charting, Optimization.

This report describes the organization of compilers to realize increased system efficiency in the areas of better hardware utilization, reduced compilation overhead, and improved man-machine communication. The principal emphasis is directed to the following topics: incremental translation, re-entrant and re-usable compilers, execution using interpretive and emulation techniques as well as conventional object code processing, and conversational source language techniques for program testing and alteration. (Author)
AD-658 196 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Technical note no. 1, 1 Apr 57-31 Mar 58,
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
J. Garcia Santesmases. 31 Mar 58, 160p
Contract AF 61 (514)-1234
See also AD-658 190 and AD-658 189

Descriptors: (*Computers, *Magnetic resonance), (*Control systems, Magnetic resonance), (*Electrical networks, Magnetic resonance), Bibliographies, Relaxation oscillators, Inductance, Logic circuits, Magnetic core storage, Wiring diagrams, Mathematical analysis, Magnetic properties.

In Chapter 1, a list is given of fifty nine publications, which deal with the ferroresonance phenomenon and its application to circuits used in computers. The information found in them was classified into three groups, namely, Ferroresonant circuit analysis, Ferroresonant flip-flop analysis, and experimental ferroresonant circuits for application to computers. Chapter 2 is intended to establish a figure of merit for magnetic materials, with relation to ferroresonance. For this purpose, characteristics were first determined for the small-size cores available, working then in terms of reduced characteristics which are independent on core size and number of turns; finally, a new figure of merit is introduced, from certain considerations on the phenomenon of ferroresonance. In Chapter 3, we give some original rules for two-branch flip-flop design, working from data which are easily obtained in the laboratory. Account is also given of experimental results obtained on two-branch, no-polarization flip-flops, and four-branch ring counters, operating under a single pulse sequence. In addition, a study is developed of the one-branch flip-flop, with polarization, working under two pulse sequences.
AD-658 217 HC$3.00 MF$0.65

SOCIAL IMPLICATIONS OF THE COMPUTER UTILITY,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 249 Not available from CFSTI.

THE DESIGN OF A GRAPHIC DISPLAY SYSTEM.
Master's thesis,
California Univ Los Angeles Dept of Engineering
Barry B. Coggan. Aug 67, 195p Rept no. 67-36
Contracts Nonr-233 (52), SD-184

Descriptors: (*Display systems, Graphics), (*Input-output devices, Digital computers), Topology, Subroutines, Compilers, Programming (Computers), Flow charting, Theses.
Identifiers: On-line systems, Light pens, Multiprocessing.

The study describes the basic specifications for a Graphic Display System that is designed to handle two areas of application: (1) Use as a special-purpose device for the control of an Instrumentation System, and observation. (2) Use as a general purpose display device that is capable of defining reasonably complex structures which will be useful to a broad field of application programs. Existing systems are first surveyed, the basic concepts of Engineering graphics are studied, and specific Instrumentation display requirements are discussed. Finally, this information is used to derive the basic specification for a Visual Information Processor (VIP) that will satisfy the constraints. (Author)
AD-658 314 HC$3.00 MF$0.65

TEST AND EVALUATION OF THE RADAR VIDEO DATA PROCESSOR.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 17G.
AD-658 337 HC$3.00 MF$0.65

MAGNETOSTRICTIVE DELAY LINE MEMORY FOR TRANSIT 4A,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
James A. Perschy. 12 Jun 61, 13p Rept no. CF-2939
Contract NOrd-7386

Descriptors: (*Delay lines, Magnetostrictive elements), (*Data storage systems, Delay lines), Data transmission systems, Logic circuits, Circuits, Timing circuits, Gates (Circuits), Navigation satellites.

The paper discusses the magnetostrictive delay line portion of the entire memory system. The decoder has as an input the video output of the command receiver. It is sensitive to an audio frequency tone. During the memory load, the first audio tone burst will cause the decoder to send a clear signal to the magnetostrictive delay line memory. At the termination of the first audio tone burst, the decoder will send a timing signal to the magnetostrictive delay line memory for the insertion of a timing marker into the memory. During the remaining load process an audio tone at the input to the decoder will be interpreted as a '1'. The absence of an audio tone will be interpreted as a zero. The timing marker inserted in the magne-

tostrictive delay line memory will re-appear every 2,048us to sample the output of the decoder until the memory is loaded. This system of loading the memory under control of the satellite timing circuitry requires that the transmission bit rate at the injection station be carefully synchronized with the memory data rate. The data readout rate from the memory is also under control of the satellite's stable oscillator and is not dependent on the exact delay period of the magnetostrictive lines.
AD-658 374 HC$3.00 MF$0.65

A DIRECT BINARY DIVIDER FOR SPECIAL PURPOSE DIGITAL COMPUTERS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
H. D. Zink. 31 Jan 61, 15p Rept no. CF-2916
Contract NOrd-7386

Descriptors: (*Digital computers, Binary arithmetic), (*Computer logic, *Binary arithmetic), Numerical methods and procedures, Shift registers, Real time, Iterative methods.
Identifiers: On-line systems.

The report describes the divider circuit developed in an attempt to solve the problem of dividing without using iterative techniques and without unduly slowing down the computation process of a digital computer.
AD-658 379 HC$3.00 MF$0.65

PERFORMANCE STATISTICS OF THE FORTRAN IV (H) LIBRARY FOR THE IBM SYSTEM/630,
Argonne National Lab., Ill.
N. A. Clark, W. J. Cody, and K. E. Hillstrom.
May 67, 38p
Contract W-31-109-eng-38

Descriptors: (*Computers, *Performance (Engineering)), (*Programming (Computers), Accuracy), Programming languages, Documentation, Errors, Numerical analysis.

For abstract, see NSA 21 18.
ANL-7321 HC$3.00 MF$0.65

ANALOG TECHNIQUE FOR OPTIMIZING DYNAMIC SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
R. A. Harvey. May 67, 15p
Contract AT (45-1)-1830

Descriptors: (*Analog computers, Optimization), (*Digital computers, Integration), Iterations, Curve fitting, Convergence, Interactions.

For abstract, see NSA 21 17.
BNWL-392 HC$3.00 MF$0.65

PROCEEDINGS OF THE 1966 SYMPOSIUM ON ENGINEERING PROBLEMS OF CONTROLLED THERMONUCLEAR RESEARCH HELD OCTOBER 3-6, 1966, IN GATLINBURG, TENNESSEE.
Oak Ridge National Lab., Tenn.
6 Oct 66, 410p
Contract W-7405-eng-26

Descriptors: (*Thermonuclear reactions, Symposia), (*Nuclear engineering, Power supplies), Superconductivity, Safety, Mechanical engineering, Plasma physics.

For abstract, see NSA 21 17.
CONF-661016 HC$3.00 MF$0.65

TOODEE A TWO-DIMENSIONAL TIME-DEPENDENT HEAT CONDUCTION PROGRAM,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
IDO-17227 HC$3.00 MF$0.65

READING SCHEDULES FOR THE MSA PARTICLE SIZE ANALYZER,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 17.
LA-3692 HC$3.00 MF$0.65

THE SOLID SYSTEM. II. NUMERIC COMPRESSION. THE SOLID SYSTEM. III. ALPHANUMERIC COMPRESSION,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 5B.
NBS-TN-413 HC$0.30 MF$0.65

A SYSTEM FOR AUTOMATIC COLLECTION OF GEOMAGNETIC DATA IN DIGITAL FORM FINAL SCIENTIFIC REPORT.
Kiruna Geophysical Observatory (Sweden).
For primary bibliographic entry see Field 6N.
For abstract, see STAR 05 20.
N67-34064 HC$3.00 MF$0.65

STATE-OF-THE-ART OF AEROSPACE DIGITAL COMPUTERS, 1962-1967.
Bellcomm, Inc., Washington, D. C.
D. O. Baechler. 22 Jun 67, 37p NASA-CR-87173, TM-67-1031-1
Contract NASW-417

Descriptors: *Digital computer, *Manned space flight, *Performance characteristics, Aerospace, Characteristics, Computer, Data, Digital, Factor, Manned, Memory, Performance, Power, Processing, Reliability, Space flight, System, Technology, Unmanned, Weight.

For abstract, see STAR 05 20.
N67-34283 HC$3.00 MF$0.65

THE DATA REQUIREMENTS OF THE TRIANGULAR MESH NEUTRON CODES TRIFID AND RAVEN.
United Kingdom Atomic Energy Authority, Risley (England). Reactor Group.
For primary bibliographic entry see Field 18K.
For abstract, see STAR 05 20.
N67-34420 HC$3.00 MF$0.65

ADDITIONAL FACILITIES AVAILABLE WITH R.A.E. PROGRAM 187/ A FOR USE IN SUPPLEMENTING SPARSE OR UNEVEN DATA.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 20.
N67-34541 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME IX - OPTIMIZATION METHODS.
General Dynamics/Convair, San Diego, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 20.
N67-35169 HC$3.00 MF$0.65

NORTHWEST RANGE-PLANT SYMBOLS,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
For primary bibliographic entry see Field 2F.
PB-175 672 HC$3.00 MF$0.65

OPTIMUM FINITE SEQUENTIAL PATTERN RECOGNITION,
Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
K. S. Fu, and G. P. Cardillo. 1967, 83p TR-ee67-9
Grant NSF-GK-696

Descriptors: (*Pattern recognition, Statistical processes), Optimization, Decision theory, Theses, Errors, Sampling, Boundary value problems, Classification, Costs, Algorithms, Models (Simulations), Character recognition, Adaptive systems.
Identifiers: On-line systems, Sequential pattern recognition.

A general formulation of sequential pattern recognition processes is presented within which a procedure is obtained for the simultaneous optimization of the stopping rule and the stage by stage ordering of features. The optimization procedure is based on backward programming and uses as an index of performance the expected cost of the process, including both the cost of feature measurements and the cost of classification errors. Examples are presented which allow a comparison with other statistical schemes, both sequential and non-sequential in nature. Some suboptimum procedures are developed which greatly simplify the design and the resulting system while retaining some of the optimality of the backward programming procedure. Examples indicate the applicability of the suboptimum procedures proposed. A modification to the backward programming procedure is employed to solve the problem of selecting an optimum subset of features from a given set for a non-sequential pattern recognition process. Finally, the sequential pattern recognition process is discussed from a learning system viewpoint and a method for non-supervised (on line) learning is developed for incorporation into the sequential system. An example of the operation of the learning algorithm is provided.
PB-175 690 HC$3.00 MF$0.65

SURVEY OF COMPUTER-PROGRAM DOCUMENTATION PRACTICES AT SEVEN FEDERAL GOVERNMENT AGENCIES.
Computing Technology, Inc., Paramus, N. J.
For primary bibliographic entry see Field 5B.
PB-175 701 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR CALCULATING VENEER RECOVERY VOLUME AND VALUE,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
For primary bibliographic entry see Field 11L.
PB-175 718 HC$3.00 MF$0.65

A COMPUTER ORIENTED SCHEME FOR CODING CHEMICALS IN THE FIELD OF BIOMEDICINE.
Western Reserve Univ., Cleveland, Ohio. Comparative Systems Lab.
For primary bibliographic entry see Field 5B.
PB-175 808 HC$3.00 MF$0.65

PROGRAM BRAGG A FORTRAN-IV PROGRAM FOR CALCULATING BRAGG CURVES AND FLUX DISTRIBUTIONS,
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
UCRL-17391 HC$3.00 MF$0.65

9C. Electronic and Electrical Engineering

A WIDE RANGE ELECTRONIC CHRONOSCOPE.
Johns Hopkins Univ Baltimore Md Engineering Lab

For primary bibliographic entry see Field 14B.
AD-657 620 HC$3.00 MF$0.65

THE MOORE SCHOOL INFORMATION SYSTEMS LABORATORY,
Pennsylvania Univ Philadelphia Moore School of Electrical Engineering
For primary bibliographic entry see Field 5B.
AD-657 809 HC$3.00 MF$0.65

MICROWAVE EMISSION FROM n-TYPE INDIUM ANTIMONIDE AT 4.2 AND 77K,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20L.
AD-657 928 Not available from CFSTI.

HARMONIC COMMUTATION APPLIED TO AN EXPERIMENTAL STATIC INVERTOR AND ITS APPLICATION TO BRUSHLESS D.C. MOTORS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
D. E. Marshall. Feb 67, 36p Rept no. RAE-TR-67048

Descriptors: (*Inverters, Electric motors), (*Electric motors, Commutators), Great Britain, Direct current, Induction motors, Inverter circuits, Switching circuits, Transistors.

A method of commutating the thyristors in a brushless d.c. motor was required which is simple and more reliable than existing methods. A method termed 'harmonic commutation' is described which is closely analogous to interpole commutation in continuous current machines. A laboratory model of an invertor has been constructed to show the feasibility of the scheme. Harmonic commutation is suitable for constant speed motor application i.e. induction motor drives, but its use in variable speed application would require unduly heavy commutating components. (Author)
AD-657 988 HC$3.00 MF$0.65

PROPOSAL FOR THE ELECTRIC MOTOR REPAIR FACILITY IN SUBMARINE TENDERS AS-36 AND AS-37.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 13J.
AD-658 094 HC$3.00 MF$0.65

A PERFORMANCE-ORIENTED ELECTRONICS TECHNICIAN TRAINING PROGRAM. III. COURSE EVALUATION INSTRUMENTS AND PROCEDURES.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5J.
AD-658 316 HC$3.00 MF$0.65

TRAINING FEEDBACK IN ELECTRONICS MAINTENANCE.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5I.
AD-658 319 HC$3.00 MF$0.65

PROCUREMENT AND EVALUATION OF AN ANECHOIC CHAMBER.
Naval Avionics Facility, Indianapolis, Ind.
For primary bibliographic entry see Field 14B.
AD-813 309 HC$3.00 MF$0.65

STAR-CONNECTED 11.4 K V DISTRIBUTION SYSTEM.
Industrial Science and Technology Agency, Tokyo (Japan). Electrotechnical Lab.
Y. Sakamoto. Dec 66, 101p
Its Res. of the Electrotech. Lab. No. 671

Descriptors: *Electric current, *Network, *Voltage, Circuit, Connection, Current, Distribution, Electric, Power, Rise, Star, System.

For abstract, see STAR 05 20.
N67-34010 HC$3.00 MF$0.65

STUDY ON A GENERAL TECHNICAL SOLUTION FOR A DATA-TRANSMISSION PROBLEM IN A NUCLEAR RESEARCH CENTER.
Studie Einer Generellen Technischen Loesung des Datenuebertragungsproble
ms in Einem Kernforschungszentrum
European Atomic Energy Community, Ispra (Italy). Engineering Dept.
W. Becker. 1967, 34p EUR-3470.D
in German, English Summary

Descriptors: *Data handling system, *Equipment specifications, *Nuclear research, Access, Cable, Center, Circuit, Coaxial, Communication, Data, Design, Equipment, Flux, Handling, Laboratory, Nuclear, Processing, Research, Signal, System, Transmission.

For abstract, see STAR 05 20.
N67-34638 HC$3.00 MF$0.65

A MATRIX METHOD FOR OBTAINING THE TRANSIENT RESPONSE OF A FILTER.
Royal Aircraft Establishment, Farnborough (England).
J. M. Freeland. Dec 66, 13p RAE-TR-66372, AD-653690

Descriptors: *Filter, *Matrix analysis, *Transient response, Analysis, Capacitance, Differential, Electric, Equation, Inductance, Laplace transform, Mathematics, Matrix, Network, Resistance, Response, Transfer, Transient.

For abstract, see STAR 05 20.
N67-34647 HC$3.00 MF$0.65

ESTIMATION USING SAMPLED-DATA CONTAINING SEQUENTIALLY CORRELATED NOISE.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
A. E. Bryson, Jr., and L. J. Henrikson. Jun 67, 23p NASA-CR-87502, TR-533
Contracts NGR-22-007-068, NONR-1866/16/

Descriptors: *Data smoothing, *Filtration, *Linear system, *Noise, *Sampled data, Computation, Correlation, Covariance, Data, Dynamic, Linear, Matrix, Prediction, Procedure, Sample, Sequence, Smoothing, State, System, Variable.

For abstract, see STAR 05 20.
N67-34745 HC$3.00 MF$0.65

ELECTRONICS FOR A MARTIAN WATER VAPOR DETECTION SYSTEM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
J. R. Locke. 15 Aug 67, 19p NASA-CR-86771, JPL-TR-32-1114
Contract NAS7-100

Descriptors: *Aluminum oxide, *Detector, *Mars (planet), *Water content, Aluminum, Analog, Atmosphere, Circuit, Content, Converter, Data, Digital, Electronics, Output, Oxide, Surface, Water.

For abstract, see STAR 05 20.
N67-34759 HC$3.00 MF$0.65

INVESTIGATIONS ON MATCHING TRANSITIONS BETWEEN WAVEGUIDES AND LECHER WIRES IN THE 3CM REGION.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).

For primary bibliographic entry see Field 20N.
For abstract, see STAR 05 20.
N67-34837 HC$3.00 MF$0.65

A NEIGHBORING OPTIMUM FEEDBACK CONTROL SCHEME BASED ON ESTIMATED TIME-TO-GO WITH APPLICATION TO RE-ENTRY FLIGHT PATHS.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 20.
N67-34936 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME IV - NONLINEAR SYSTEMS.
General Dynamics/Convair, San Diego, Calif.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-34940 HC$3.00 MF$0.65

RADAR TEST SET AN/UPM-98 AN/UPM-99 AN/UPM-111 TS-1253/UP. CODER SIMULATOR SM-189/UPM-99 SM-197/UPM-98. TEST LEAD MX-2681/UP.
Technical manual instrument calibration procedure, GQ-04.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
15 Jun 67, 81p
NAVAIR-17-20GQ-04

Descriptors: (*Calibration, *Test sets), Instruction manuals, Test equipment (Electronics), Test methods, Radar.

The procedure describes the calibration of the AN/UPM-98, AN/UPM-99, or AN/UPM-111 radar test sets. The AN/UPM-98 consists of the TS-1253/UP radar test set, the SM-197/UPM-98 coder simulator, and accessories. The AN/UPM-99 consists of the TS-1253/UP radar test set, the SM-189/UPM-99 coder simulator, the PP-2391/UPM power supply, and accessories. The AN/UPM-111 consists of the TS-1253/UP radar test set and accessories. The MX-2681/UP test lead is the only accessory normally requiring calibration. (Author)
PB-175 673 HC$3.00 MF$0.65

ELECTRIC, ELECTRONIC HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command Washington, D. C.
For primary bibliographic entry see Field 5A.
PB-175 713 HC$3.00 MF$0.65

9D. Information Theory

DYNAMIC COMMUNICATION NETWORKS.
Revised ed.,
California Univ Berkeley
Howard Frank. 10 Nov 66, 11p
AROD-5177:9
Grants DA-ARO (D)-31-124-G776, AF-AFOSR-139-66
Revision of manuscript submitted 1 Aug 66.
Availability: Published in IEEE Transactions on Communication Technology vCOM-15 n2 p156-63 Apr 1967.

Descriptors: (*Information theory, Mathematical models), Graphics, Linear systems, Networks, Mathematical analysis, Time-lag theory.

A finite time delay may often be associated with each branch in a communication network. That is, a given length of time is required for a flow to traverse each branch. In this paper, this model is described by a set of discrete input-output state

equations. Conditions for the network to behave conservatively (in the sense that flow is neither created nor destroyed) are derived. The special case of linear state equations is examined, and asymptotic properties of flow and a transfer function are given. The idea of satisfying demands at the stations of the net is related to state reachability. Bounded input systems and an example of a time-varying linear system are also considered. (Author)
AD-657 543 Not available from CFSTI.

THE TWO CONCEPTS OF INFORMATION,
George Washington Univ Washington D C
S. Kullback. 1967, 4p
AFOSR-67-1973
Grant AF-AFOSR-932-65
Availability: Published in Journal of the American Statistical Association v62 p685-6 Jun 1967.

Descriptors: (*Information theory, Statistical analysis), Probability, Mathematics.
Identifiers: Likelihood.

This note broadens the scope of some statements in Kempthorne, 'Some aspects of experimental inference,' J. Am. Stat. Assn. 61 (1966), 11-34 and corrects one formula therein. (Author)
AD-657 746 Not available from CFSTI.

PRIOR INFORMATION AND BIAS IN SEQUENTIAL ESTIMATION,
Rand Corp Santa Monica Calif
Allen Klinger. Aug 67, 7p Rept no. P-3655
Prepared in cooperation with Jet Propulsion Lab., Pasadena, Calif.

Descriptors: (*Information theory, Sequential analysis), Trajectories, Noise, Errors, Decision theory, Optimization, Mathematical analysis.
Identifiers: Filter (mathematics).

This article applies discrete sequential filtering to estimation of an unknown vector x imbedded in nonstationary uncorrelated noise, when observations depend linearly on x in a time-varying manner. Such a situation occurs in trajectory determination close to the earth. We solve the recursive filter equations to obtain the n-th estimate of x, xn, and its convariance matrix Pn, in terms of the observations (zi, i=1, ..., n) and initial values xo, Po. These expressions illustrate how the a priori information can introduce bias into the sequential estimates.
AD-657 754 HC$3.00 MF$0.65

UNSUPERVISED LEARNING, MINIMUM RISK ADAPTIVE PATTERN CLASSIFICATION.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9B.
AD-657 759 HC$3.00 MF$0.65

THE EFFECT OF BSC ON PCM PICTURE QUALITY.
Revised ed.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Thomas S. Huang, and Mohamed T. Chikhaoui.
5 Jul 66, 4p
Contract DA-36-039-AMC-03200 (E), Grant NSF-GK-835
Revision of manuscript submitted 23 May 66. Research supported in part by PHS, and NASA.
Availability: Published in IEEE Transactions on Information Theory vIT-13 n2 p270-3 Apr 1967.

Descriptors: (*Television communication systems, Pulse code modulation), (*Pulse code modulation, Noise), Radiofrequency interference, Information theory, Signal-to-noise ratio, Acceptability.

Some results are reported on the subjective effect of noise introduced in the received pictures of a PCM system by a binary symmetrical channel. More specifically, such noise was compared with noise introduced by an additive white Gaussian channel to a PAM system. It was found that for high signal-to-noise ratios, the Gaussian noise is more objectionable than the BSC noise, while the reverse is true for low signal-to-noise ratios. The crossover point lies in the range 16-20 dB peak signal-to-noise ratio, and tends to occur at a higher signal-to-noise ratio for a picture containing more details. (Author)
AD-657 910 Not available from CFSTI.

AN ADAPTIVE TECHNIQUE FOR MULTIPLE SIGNAL DETECTION AND IDENTIFICATION,
Rome Air Development Center Griffiss AFB N Y
For primary bibliographic entry see Field 17B.
AD-658 015 HC$3.00 MF$0.65

RANDOM STORE AND FORWARD COMMUNICATION NETWORKS WITH APPLICATIONS TO PATTERN RECOGNITION.
Doctoral thesis,
Columbia Univ Dobbs Ferry N Y Hudson Labs
Stephen D. Shapiro. Apr 67, 140p Rept no. ARTEMIS-58
Contract Nonr-266 (66)

Descriptors: (*Information theory, Pattern recognition), (*Pattern recognition, Decision theory), Mathematical models, Communication systems, Networks, Signals, Errors, Teletype systems, Theses.

A random network model which may be used to represent various physical processes is described. These processes include signal flow in a teletype network where the lines joining pairs of stations are not always available, in a network where signals may be lost in transmission or at any node, and in a group of people where simultaneous knowledge of a signal (message) by all members is desired. Other processes which take place in store and forward communication networks may be represented formally using the model. Among these are alternate routing procedures, generation of copies to reduce overall delay, transmission from multiple sources to multiple destinations, circulation or looping of messages, and random overall message delay.
AD-658 136 HC$3.00 MF$0.65

A STOCHASTIC MODEL OF MESSAGE INTERCHANGE ON A CHANNEL WITH TRANSMISSION DELAY.
New York Univ N Y Dept of Electrical Engineering
For primary bibliographic entry see Field 17B.
AD-658 255 Not available from CFSTI.

DETECTION OF CHANGES IN THE CHARACTERISTICS OF A GAUSS- MARKOV PROCESS.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
Y. C. Ho, and P. M. Newbold. Jun 67, 43p
NASA-CR-87477, TR-531
Contracts NGR-22-007-068, NONR-1866/16/

Descriptors: *Gauss-markov theorem, *Probability distribution, *Sequential detection, Computer, Detection, Distribution, Fault, Gyro, Navigation, Probability, Ratio, Sequence, Simulation, System, Test.

For abstract, see STAR 05 20.
N67-34543 HC$3.00 MF$0.65

INFLUENCE OF BANDWIDTH RESTRICTION ON THE SIGNAL-TO-NOISE PERFORMANCE OF A PCM/NRZ SIGNAL.
European Space Technology Center, Delft (Netherlands).
For primary bibliographic entry see Field 17A.
For abstract, see STAR 05 20.
N67-34945 HC$3.00 MF$0.65

9E. Subsystems

STUDY OF I-F TRANSFORMERS FOR SINGLE SIDEBAND OPERATION.
Illinois Inst. of Tech., Chicago. Electronics Research Lab.
For primary bibliographic entry see Field 9A.
AD-275 166 HC$3.00

PROBLEMS AND SOLUTIONS IN THE FABRICATION OF H-FILM (KAPTON) FLEXIBLE CIRCUITS,
Martin Co., Orlando, Fla.
For primary bibliographic entry see Field 11C.
AD-479 560 HC$3.00 MF$0.65

MAXIMISATION OF DIRECTIVE GAIN FOR CIRCULAR AND ELLIPTICAL ARRAYS.
Revised ed.,
Syracuse Univ N Y Dept of Electrical Engineering
David K. Cheng, and Fung-I Tseng. 2 Jan 67, 12p Rept no. Scientific-1
AFCRL-67-0402
Contract AF 19 (628)-5668
Revision of manuscript submitted 21 Oct 66.
Availability: Published in Proceedings of the Institution of Electrical Engineers v114 n5 p589-94 May 1967.

Descriptors: (*Antenna arrays, Gain), Ellipsoids, Rings, Radiofrequency power, Antenna radiation patterns, Efficiency, Optimization.

The report begins with a general formulation of the gain-optimisation procedure for an array with an arbitrary geometrical configuration. The formulation is then specialised to apply to a planar array. In particular, extensive computed data for the maximum obtainable directive gain of circular and elliptical arrays are presented and compared with those with a uniform amplitude and cophasal excitation. For small element separations, a supergain situation results under optimum-gain conditions. A main-beam radiation efficiency is defined, which serves as an additional performance index. In a supergain situation, a proper design represents a suitable compromise between the directive gain and the main-beam radiation efficiency. (Author)
AD-657 554 Not available from CFSTI.

A METHOD FOR ESTABLISHING REALIZABLE NETWORKS OF ELECTRONIC DEVICES.
Memorandum rept.,
Ballistic Research Labs Aberdeen Proving Ground Md
Harold Raub. Jul 67, 38p Rept no. BRL-MR-1857

Descriptors: (*Networks, Analysis), Electrical networks, Admittance, Electrical impedance, Resistance (Electrical), Synthesis, Measurement, Transistors, Semiconductor devices, Ultrahigh frequency.

A method is developed for the characterization of active solid-state devices when used at high frequencies. This requires establishment of a technique for obtaining realizable networks which provide accurate representations of the devices over a broad frequency spectrum. The process can be helpful in the design of circuits using vacuum tubes as well as various solid-state electron devices such as transistors, especially in the UHF region where parasitics play an important role. The procedure entails many measurements but provides informa-

tion which may not be available by other methods. (Author)
AD-657 560 HC$3.00 MF$0.65

A PHYSICAL COMPARATOR FOR THE COLOR TEMPERATURES OF INCANDESCENT LAMPS.
Technical rept.,
Johns Hopkins Univ Baltimore Md Engineering Lab
E. J. King, A. E. Snider, and F. Hamburger, Jr.
15 Jul 51, 16p
SPECDEVCEN-166-1-133
Contract N5ori-166 (01)

Descriptors: (*Comparators, *Incandescent lamps), Light, Colors, Temperature, Photomultipliers, Optical filters, Calibration.

An apparatus was assembled and used to evaluate the color temperatures of incandescent tungsten lamps by physical comparison techniques. A red-to violet ratio method of establishing the effective slope of the radiometric function is utilized. The apparatus uses a single 931-A photomultiplier to receive radiations from the 'standard' and 'unknown' lamps through red and violet filters sequentially. Resultant oscilloscope patterns are judged for equality. Accurate results can be obtained in a short period of time, thus permitting large quantities of lamps to be calibrated with a minimum of effort. (Author)
AD-657 618 HC$3.00 MF$0.65

ELECTROMAGNETIC INTERFERENCE MEASUREMENT METHODS-SHIELDED ENCLOSURE.
Georgia Inst of Tech Atlanta Engineering Experiment Station
For primary bibliographic entry see Field 20N.
AD-657 669 HC$3.00 MF$0.65

SELF-REPAIR THEORY INVESTIGATION.
Quarterly rept. no. 3, 1 Jan-31 Mar 67,
Pennsylvania Research Associates Inc Philadelphia
Edward W. Veitch. Jul 67, 41p
ECOM-02344-3
Contract DA-28-043-AMC-02344 (E)
See also AD-652 280.

Descriptors: (*Networks, *Maintenance), Theory, Digital systems, Logic circuits, Failure (Electronics), Redundant components.

The report is the third of a study to develop a theory of self repair in digital nets via fault diagnosis and automatic circuit replacement. The technique of factoring the Sequential Prime Implicant Form of the sequential digital net is extended to show how monitoring circuitry can be added to detect failures and switch in replacement circuitry. (Author)
AD-657 671 HC$3.00 MF$0.65

THE ANTENNA CHARACTERISTICS AT 820 MHz OF THE DWINGELOO RADIO TELESCOPE,
National Research Council of Canada Ottawa (Ontario) Radio Astronomy Section
L. A. Higgs. 17 Mar 67, 20p
NRC-9556
Availability: Published in Bulletin of the Astronomical Institutes of the Netherlands Supplement Series v2 n2 p59-76 Jul 1967.

Descriptors: (*Antennas, Radio telescopes), Netherlands, Ultrahigh frequency, Antenna radiation patterns, Polarization, Measurement.

For a survey of celestial radio emission in absolute units, the directivity, response pattern and ohmic losses of the radio telescope must be well determined. In connection with such a survey at 820 MHz, planned by Leiden Observatory, the antenna pattern of the 25-metre paraboloid at Dwingeloo, the Netherlands, has been determined experimentally at this frequency. The mean response in two orthogonal polarizations has been measured down to a level of - 65 db with respect to the main beam over a solid angle of 2 pi steradians, using a transmitter on a 300-metre tower in the far field of the antenna. The response within the full beam solid angle was determined using astronomical radio sources. It was found that systematic errors existed in the observed pattern and approximate corrections for these were made. Using the corrected data, the antenna directivity and stray factor were derived. In addition, components of antenna temperature due to atmospheric and ground emission have been estimated on the basis of a model of the antenna environment. The uncertainty in a value of full beam brightness temperature derived using this antenna is estimated, considering the uncertainties in the knowledge of the antenna's properties and environment. The probable error in such a determination is found to be approx. 5K. (Author)
AD-657 695 Not available from CFSTI.

UHF TRANSMISSION LINE CAPABLE OF CONTINUOUS RADIATION ALONG ITS AXIS,
Furukawa Electric Co Ltd Tokyo (Japan)
Hiroshi Murata. Nov 62, 22p
Annual Symposium on Technical Progress in Communication Wire and Cable (11th).

Descriptors: (*Slot antennas, *Transmission lines), Ultrahigh frequency, Japan, Very high frequency, Coaxial cables, Configuration, Design, Attenuation.

A radiative coaxial cable for VHF and UHF bands can be manufactured by cutting slots in its outer conductor and a slit on the opposite side. Any coupling loss can be obtained by changing the length of the slot or by changing its angle. While the loss as a transmission line is not very large in case the coupling loss is +60 db (2 m off) or over, the radiation loss rapidly increases at less than +60 db, with a resultant increase in transmission line loss, which fact is undesirable from the practical point of view. Accordingly, design should be made at a coupling loss of +60 db or over.
AD-657 829 HC$3.00 MF$0.65

ON THE MAPPING OF EXTENDED SOURCES WITH NONLINEAR CORRELATION ANTENNAS.
Revised ed.,
Air Force Cambridge Research Labs L G Hanscom Field Mass
C. J. Drane, and G. B. Parrent, Jr. 12 Aug 61, 8p
Rept no. AFCRL-62-509
Revision of manuscript submitted 25 Mar 61.
Availability: Published in IRE Transactions on Antennas and Propagation vAP-10 n2 p126-30 Mar 1962.

Descriptors: (*Antennas, Nonlinear systems), Theory, Coherent radiation, Antenna arrays, Sources, Radiofrequency, Extraterrestrial radio waves, Mapping, Correlation techniques, Statistical functions.

Nonlinear correlation antennas are examined in terms of coherence theory. Particular emphasis is given to an antennas system consisting of the correlation of the outputs of two arbitrary antennas. It is shown that such a system operates in a linear fashion for an extended incoherent source. In fact, a flat spatial frequency response for this system can be obtained when, in particular, one antenna is a continuous array with a uniformly illuminated aperture, while the other is a simple interferometer. (Author)
AD-657 884 Not available from CFSTI.

HARMONIC COMMUTATION APPLIED TO AN EXPERIMENTAL STATIC INVERTOR AND ITS APPLICATION TO BRUSHLESS D.C. MOTORS.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 9C.
AD-657 988 HC$3.00 MF$0.65

ACTIVE RC DELAY NETWORKS USING OPERATIONAL AMPLIFIERS.
Technical rept.,
New York Univ N Y Lab for Electroscience Research
John F. O'Neill. May 67, 31p Rept no. Scientific-6, TR-400-159
AFCRL-67-0333
Contract AF 19 (628)-5537
See also AD-652 502.

Descriptors: (*Delay circuits, *Resonators), Amplifiers, Networks, Resistors, Capacitors, Synthesis, Transfer functions.

It has been shown that an active lattice connection of two pole subcircuits, or resonators, is an effective structure for active RC transfer function synthesis. This arrangement is especially attractive when non-minimum phase functions are to be realized, in that the replacement ratio of amplifiers to coils is low, and the lattice is therefore economical. In this paper, several methods for applying the active lattice to multipole delay networks are discussed, and an example four-pole constant delay network is treated in detail. (Author)
AD-658 020 HC$3.00 MF$0.65

THEORETICAL STUDY OF DIPOLE ARRAY OF N PARALLEL ELEMENTS,
Harvard Univ Cambridge Mass Cruft Lab
V. W. H. Chang, and R. W. P. King. May 67, 137p Rept no. Scientific-18-Ser-3
AFCRL-67-0404
Contract AF 19 (628)-2406, Grant NSF-GK-273

Descriptors: (*Dipole antennas, Antenna arrays), Theory, Integral equations, Approximation (Mathematics), Electric currents, Antenna radiation patterns.

The five-term method developed for two arbitrarily located parallel antennas has been successfully extended to a general antenna array of N parallel elements. The method is illustrated with a planar array and a three-dimensional array. Arrays of both full-wave and half-wave elements are discussed. The array is characterized either by specifying driving voltages or by specifying input currents. When the array is of half-wave elements, the conventional EMF method which assumes sinusoidal currents is also carried out in detail for comparison. When the array is of full-wave elements, the EMF method is not applicable; however, equal magnitude sinusoidal currents are assumed and carried out. The difference between these two theoretical results is not always negligible even for the case of half-wave elements or field pattern comparison. (Author)
AD-658 030 HC$3.00 MF$0.65

JUNCTION TRANSISTOR INTEGRATOR AND DIFFERENTIATOR CIRCUITS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. B. Oakes. 8 Jul 53, 21p Rept no. CF-2043

Descriptors: (*Integrators, Transistors), (*Differentiating circuits, Transistors), Feedback amplifiers, Theory, Circuits, Design, Mathematical analysis.

Theoretical analyses are carried out for transistor integrators and differentiators of the single-stage, negative-feedback amplifier type, assuming linear circuit theory and the applicability of the low-frequency transistor equivalent circuit. Comparisons are made between the theoretical results thus obtained and measured behavior of actual circuits. In all cases, excellent agreement is obtained. A practical single-stage circuit has been designed for the integration of 50 volt pulses, 10 microsecs

in width. The output waveform is linear within 3%. A second practical circuit allows accurate integration of 1000 cps sine and square waves. In addition, a single-stage transistor circuit has been designed which allows the accurate differentiation of sinusoidal and triangular wave input voltages. (Author)
AD-658 087 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TOE-22 VOLTAGE CONTROLLED OSCILLATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 088 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TNL-5 LOW PASS FILTER.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 6p Rept no. CF-1900
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Low-pass filters, *Quality control), Tests, Specifications, Performance (Engineering), Test methods.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, tests and tagging.
AD-658 093 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-10A COMMUTATING SWITCH (ASCOP MODEL 4-30S-5B),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1913

Descriptors: (*Electronic commutators, *Quality control), Telemeter systems, Specifications, Performance (Engineering), Test methods, Tests.

The specification includes requirements for construction, serial numbering visual inspection, test data, electrical and physical test equipment, tests, and tagging.
AD-658 100 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-X15 COMMUTATING SWITCH (ASCOP 2-30S-5B),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1915

Descriptors: (*Electronic commutators, *Quality control), Telemeter systems, Specifications, Performance (Engineering), Test methods, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, tests, and tagging.
AD-658 101 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-33 COMMUTATING SWITCH (ASCOP MODEL 2-60S-5CA),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1914

Descriptors: (*Electronic commutators, *Quality control), Telemeter systems, Specifications, Performance (Engineering), Test methods, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, tests, and tagging.
AD-658 102 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TRE-1 AND TRE-2 VOLTAGE REGULATORS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 5p Rept no. CF-1908
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Voltage regulators, *Quality control), Airborne, Performance (Engineering), Test methods, Tests, Specifications.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, and tests.
AD-658 103 HC$3.00 MF$0.65

TOE-27 VOLTAGE CONTROLLED OSCILLATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 112 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-5A PROGRAM COMMUTATING SWITCH (ASCOP MODEL 2-30S-1/3P),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 116 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-3B COMMUTATING SWITCH (ASCOP MODEL 2-30S-5A),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 117 HC$3.00 MF$0.65

ANTENNA TESTING RANGE AND FACILITIES,
New Mexico State Univ University Park Physical Science Lab
For primary bibliographic entry see Field 14B.
AD-658 118 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TQR-1A STANDARD BRIDGE ADAPTER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 5p Rept no. CF-1906
Prepared in cooperation with Bendix Aviation Corp., North Hollywood, Calif. Pacific Div.

Descriptors: (*Adapters, *Electric bridges), Quality control, Airborne, Performance (Engineering), Test methods, Specifications, Tests, Calibration.

The specification includes requirements for: construction, serial numbering, visual inspection, calibration, operational tests, and tagging.
AD-658 119 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TNN-X5 DUAL RANGE INPUT VOLTAGE LIMITER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 6p Rept no. CF-1905
Prepared in cooperation with Bendix Aviation Corp., North Hollywood, Calif. Pacific Div.

Descriptors: (*Limiters, Quality control), Performance (Engineering), Test methods, Specifications, Tests, Calibration, Voltage, Airborne.

The specification includes requirements for construction, serial numbering, visual inspection, and tests.
AD-658 121 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TAA-3 SQUARE WAVE AMPLIFIER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 7p Rept no. CF 1904
Prepared in cooperation with Bendix Aviation Corp., North Hollywood, Calif. Pacific Div.

Descriptors: (*Amplifiers, Quality control), Airborne, Performance (Engineering), Test methods, Specifications, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test equipment, tests, and tagging.
AD-658 122 HC$3.00 MF$0.65

PRELIMINARY RESULTS OF THERMAL SHOCK TESTS ON PRINTED WIRING,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
I. B. Irving, and C. D. Smith. 23 Jul 53, 9p Rept no. CF-2063

Descriptors: (*Printed circuits, Thermal shock), Tests, Photoengraving, Plastics, Copper coatings.

Two printed wiring XXXP Formica boards fabricated by the photo-etching process were put through fifty cycles of thermal shock by lowering the temperature to -40F. and then raising the temperature as quickly as possible to +200F. Power was applied to the 10 circuits on each board at all times. No lifting, cracking, or breaking of the circuits was observed. The plastic remained unharmed. A slight rolling of the plug contacts was noted. (Author)
AD-658 134 HC$3.00 MF$0.65

NEGATIVE FEEDBACK IN SINGLE STAGE JUNCTION TRANSISTOR AMPLIFIERS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. B. Oakes. 25 May 54, 25p Rept no. CF-2215

Descriptors: (*Transistor amplifiers, Feedback), Electrical impedance, Gain, Sensitivity, Graphics, Feedback amplifiers.

General conclusions drawn concerning the effect of feedback on a common emitter amplifier are: Series feedback (1) Increases the low frequency input and output impedances of the transistor itself. (2) Decreases the voltage gain, current gain, and gain-bandwidth product of the amplifier. (3) Increases the upper cutoff frequency of the amplifier. (4) Decreases the sensitivity of the amplifier to changes in the transistor parameters; Shunt feedback (1) Decreases the low frequency input and output impedances of the transistor itself. (2) Decreases the voltage gain, current gain, and gain-bandwidth product of the amplifier. (3) Increases the upper cutoff frequency of the amplifier. (4) Decreases the sensitivity of the amplifier to changes in the transistor parameters. (Author)
AD-658 139 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TOE-21 VOLTAGE CONTROLLED OSCILLATOR,

Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 12p Rept no. CF-1898

Descriptors: (*Voltage-controlled oscillators, *Quality control), Performance (Engineering), Test methods, Specifications, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, tagging, test equipment, and tests.
AD-658 143 HC$3.00 MF$0.65

X-BAND HIGH POWER CW AMPLIFIER AND AMPLIFIER CONSOLE.
Final rept. 1 Jul 63-31 Mar 67,
Microwave Electronics Palo Alto Calif
Robert E. Eggers, and Norman H. Pond. Aug 67, 158p
ECOM-03334-F
Contract DA-36-039-AMC-03334 (E)
See also AD-615 001.

Descriptors: (*Traveling-wave tubes, *Microwave amplifiers), (*X band, Microwave amplifiers), Radiofrequency power, Electrical properties, Reliability (Electronics), Mechanical properties, Circuits, Power supplies, Cooling, Performance (Engineering), Efficiency, Impedance matching, Taper.

A 12.5-kW, 7.7 to 8.4 GHz traveling-wave tube and its associated operating equipment has been developed. This traveling-wave tube operates at a power level of 12.5-kW CW with minimum efficiency of 35 percent. The demonstrated life of this device is in excess of 2,000 hours. This report describes in detail the electrical and mechanical properties of the traveling-wave tube and its associated console. A chronological summary of the development program and a discussion of each of the major problems encountered is given. Recommendations for future work in this general area are included. (Author)
AD-658 171 HC$3.00 MF$0.65

LASA SUBARRAY ELECTRONICS MODULE (SEM) TELEMETRY Q MODIFICATION (SEM MOD 20),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 9F.
AD-658 180 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
For primary bibliographic entry see Field 9B.
AD-658 189 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
For primary bibliographic entry see Field 9B.
AD-658 190 HC$3.00 MF$0.65

MODELING OF INTEGRATED CIRCUIT EFFECTIVENESS (MICE).
Final rept.,
Radio Corp of America Camden N J Defense Electronic Products
Bernard F. Tiger, and David I. Troxel. Jul 67, 111p
RADC-TR-67-267
Contract AF 30 (602)-3526

Descriptors: (*Integrated circuits, Reliability (Electronics)), Effectiveness, Quality control, Non-destructive testing, Silicon, Mathematical models, Failure (Electronics).

A Stress Survival Matrix Test (SSMT) and Physical Effects Analysis (PEA) program was conducted on a type of monolithic silicon integrated circuit from two vendors. The purposes of the program were to identify the basic reliability characteristics of integrated circuits and determine an approach to reliability prediction having greater practicality and validity than the currently used techniques. The development of the SSMT, analysis of the resulting data, and the PEA results are described. It is shown that the reliability of suitably used integrated circuits is not primarily a function of usage factors such as temperature, power or shock. It is more directly dependent on (1) screening effectiveness, (2) the failure mechanisms which exist in field use units and (3) the life distributions and environmental susceptibilities of the units which have these failure mechanisms. These results suggest that failure rate decreases with time as the deviate units (i.e., those containing failure mechanisms) drop out of the population of survivors. The problem of assuring suitable usage is discussed. Finally an appropriate prediction approach, incorporating the pertinent factors that affect reliability, is identified. (Author)
AD-658 199 HC$3.00 MF$0.65

STUDY OF CROSSED-FIELD AMPLIFIERS.
Quarterly progress rept. no. 14, 16 Sep-15 Dec 66,
California Univ Berkeley Electronics Research Lab
K. A. Fox, R. Y. C. Ho, M. A. Meyer, S. Swierkowski, and C. W. Turner. Apr 67, 21p Rept no. 15
ECOM-02164-15
Contract DA-36-039-AMC-02164 (E)
See also AD-629 904.

Descriptors: (*Crossed field devices, *Amplifiers), (*Microwave amplifiers, Crossed field devices), Electron guns, Cathodes (Electron tubes), Electron beams, Interactions, Semiconductors, Acoustics, Electrons, Noise (Radio), Indium antimonides, Piezoelectric crystals, Electromagnetic waves, Propagation, Electromagnetic properties, Solid state physics.

Topics included are: Low-noise crossed-field microwave amplifier; Crossed-field shielded-cathode electron gun studies; Cathode region studies; Crossed-field acoustic-wave interaction; Crossed-field electromagnetic interactions in semiconductors.
AD-658 200 HC$3.00 MF$0.65

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Quarterly progress rept. no. 4, 1 Mar-31 May 67,
Microwave Electronics Palo Alto Calif
Peter Young. Aug 67, 29p
ECOM-02120-4
Contract DA-28-043-AMC-02120 (E)

Descriptors: (*Limiters, Broadband), (*Magnetostrictive elements, Broadband), Ferromagnetic materials, Microwave equipment, Duplexers (Electronic), Yttrium compounds, Iron compounds, Garnet, Helixes, Magnetostriction, Transducers.

Coupling of an electromagnetic wave to the lowest order surface magnetostatic wave in a transversely magnetized YIG sample has been observed in S-band. Improved matching into a rutile waveguide has been achieved. Some experimental evidence has been obtained to check the dispersion curve for the surface magnetostatic mode. A new helix has been designed and fabricated, and its loss characteristic has been measured. (Author)
AD-658 202 HC$3.00 MF$0.65

RESEARCH ON FERRORESONANT COMPUTER AND CONTROL DEVICES.
Consejo Superior de Investigaciones Cientificas Madrid (Spain) Instituto de Electricidad Y Automatica
For primary bibliographic entry see Field 9B.
AD-658 217 HC$3.00 MF$0.65

FILTER CRYSTAL PARAMETER MEASUREMENTS WITH FREQUENCY MODULATED SIGNALS (SWEEP FREQUENCY METHODS): FREQUENCY RANGE 1 MHz TO 350 MHz.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Frank K. Priebe. Jun 67, 110p Rept no. ECOM-2845

Descriptors: (*Crystal filters, Test methods), Quartz, Measurement, Sweep generators, Instrumentation, Frequency synthesizers, Logarithmic amplifiers, Frequency modulation, Attenuation, Electrical impedance, Resistance (Electrical), Electrical properties.

It is shown that it is possible to extract from the crystal mode spectrum a large amount of information with an accuracy of 2-5%. The use of the mode spectrum constitutes a great savings of time compared with other (point-by-point) methods. This is particularly true if a signal source of adequately high precision is used, so that the characteristics of the frequency response can be determined with sufficient precision relative to each other. Typical mode spectra are considered, covering a frequency range from less than 1.0 MHz to at least 350 MHz. A wide variety of component instruments were used for the measurement arrangements. The parameters were studied not only as a function of the frequency mode response, but also as function of the phase-frequency and phase-amplitude response. Immittance bridges were used exclusively for the response determination. The effects of the tuning conditions of the bridge on the mode spectrum response are illustrated. Methods for determining the magnitude of the individual parameter values from the response spectrum are discussed. The minimum conductance that could be detected was of the order of 0.1 millisiemens. The investigation was not restricted to filter crystals alone; high 'Q', high precision crystals are also covered. Most emphasis was placed on studying a wide variety of instruments but it is by no means claimed that this study is exhaustive. It is certain that there exist many other commercial instruments which perform as good as, or better than, the ones studied, but the general nature of the techniques given are applicable in any event. (Author)
AD-658 221 HC$3.00 MF$0.65

PRACTICAL CONSEQUENCES OF MODAL PARAMETER CONTROL IN CRYSTAL RESONATORS.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-658 222 HC$3.00 MF$0.65

THE PRINCIPAL FACTORS DETERMINING THE DIRECTIONAL PATTERN OF A DIELECTRIC ANTENNA,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
G. Zh. Rankis. 3 Jul 67, 17p
RSIC-686, TT-67-62852
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Radiotekhnika (USSR) v9 n1 p97-104 1966.

Descriptors: (*Antennas, Dielectrics), Antenna radiation patterns, Determination, Waveguides, Integral equations, USSR.

The directional pattern of a dielectric antenna is analyzed on the basis of integral equations. Additional factors are established which determine the difference of the directivity pattern of a real anten-

na from an idealized linear travelling-wave antenna: direct radiation of the exciting junction, a supplementary field in the region of the exciting junction, etc. Estimates of the magnitude of their influence were obtained for different varieties of dielectric antennas. The properties of conical dielectric antennas are briefly examined. (Author)
AD-658 225 HC$3.00 MF$0.65

THE GROWTH AND ETCHING OF Si THROUGH WINDOWS IN SiO,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 20B.
AD-658 248 Not available from CFSTI.

QUASI-STATIC FIELDS OF ELECTRIC DIPOLE ANTENNAS AT THE SURFACE OF AN ANISOTROPIC HALF-SPACE.
Research rept.,
Navy Underwater Sound Lab New London Conn
Peter R. Bannister. 3 Aug 67, 20p Rept no. USL-383

Descriptors: (*Dipole antennas, Propagation), Electric fields, Magnetic fields, Partial differential equations.

The electric and magnetic field components produced by vertical and horizontal electric dipoles located at the surface of a semi-infinite anisotropic medium have been derived and presented for the quasi-static range. The receiving antenna has also been assumed to be located at the earth's surface. It is shown that when the coefficient of anisotropy is unity, the results reduce to those of the isotropic earth. Some numerical values for the field-component functions have also been provided. (Author)
AD-658 320 HC$3.00 MF$0.65

A ZERO TO THIRTY-FIVE DB X-BAND WAVEGUIDE MODULATOR PROVIDING SINUSOIDAL VARIATION OF POWER WITH CARD ROTATION,
Virginia Univ Charlottesville Ordnance Research Lab
D. F. Nieman, and W. H. Dancy. 28 Jun 54, 13p
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2219.

Descriptors: (*Modulators, Waveguides), X band, Radar signals, Modulators, Radiofrequency power.

Laboratory testing and study of radar receivers often require that the incoming signal be subjected to various types and amounts of modulation in order to simulate the conditions under study. One particular problem encountered involved the modulation of an x-band signal in the following manner. (a) Power varies sinusoidally with time; (b) Frequency of modulation to vary from a fraction of a cycle per second up to approximately 100 c.p.s.; (c) Depth of modulation to vary from 0 to 35 db. This problem was solved by the construction of a rotating card-type modulator. The discussion of the theory, construction, and testing of this modulator is contained in this report.
AD-658 332 HC$3.00 MF$0.65

THE SERIES/SECOND-HARMONIC MAGNETIC AMPLIFIER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
R. A. Freiberg. 7 Mar 62, 43p Rept no. CF-2976
Contract NOrd-7386

Descriptors: (*Magnetic amplifiers, Mathematical analysis), Voltage, Gain, Dynamics.

Contents: Average voltage output, static gain; Winding voltages and firing time; Gate voltages; Control current; Dynamic response.
AD-658 387 HC$3.00 MF$0.65

A 15 K V TRIGGER-GENERATOR WITH SPARK GAP.
15 Kv Triggergeraet Mit Funkenstrecke
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
R. C. Kunze, and E. V. Mark. Jun 67, 13p IPP-4/43
in German, English Summary

Descriptors: *Kerr cell, *Pulsed generator, *Spark gap, Cell, Discharge, Fast, Gap, Generator, High voltage, Jitter, Lifespan, Low, Power, Pulse, Rise, Spark, Transient, Trigger.

For abstract, see STAR 05 20.
N67-34499 HC$3.00 MF$0.65

FEED-BACK ACCELEROMETER CIRCUITS WITH A VELOCITY OUTPUT.
Aeronautical Research Council (Gt. Brit.)
For primary bibliographic entry see Field 1D.
For abstract, see STAR 05 20.
N67-34664 HC$3.00 MF$0.65

9F. Telemetry

SIMPLIFIED AUTOMATIC DATA PLOTTER FOR FM/FM TELEMETER SYSTEMS 'SADAP',
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14C.
AD-658 086 HC$3.00 MF$0.65

TELEMETERING RECEIVER CHARACTERISTICS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. W. Hamblen. 9 Apr 53, 6p Rept no. CF-2006

Descriptors: (*Telemetering receivers, Performance (Engineering)), Automatic gain control, Automatic frequency control, Distortion, Sensitivity, Tests.

The receiver tests set forth 'Radio engineers handbooks' were reviewed with considerable interest, and were found in general somewhat questionable as to method and purpose relative to the current test field frequency congestion problem.
AD-658 114 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-5A PROGRAM COMMUTATING SWITCH (ASCOP MODEL 2-30S-1/3P),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 116 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-3B COMMUTATING SWITCH (ASCOP MODEL 2-30S-5A),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 117 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE AN/DKT-5A TELEMETER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 7p Rept no. CF-1902
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif., Pacific Div. Development Labs.

Descriptors: (*Telemeter systems, Quality control), Performance (Engineering), Test methods, Specifications, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, tests, and tagging.
AD-658 124 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TXV-12 TRANSMITTER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 11p Rept no. CF-1897
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif., Pacific Div. Development Labs.

Descriptors: (*Telemetering transmitters, *Quality control), Airborne, Performance (Engineering), Specifications, Test methods, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, tests, and tagging.
AD-658 126 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE CALIBRATION CURVES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 8p Rept no. CF-1896
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Div. Development Labs.

Descriptors: (*Telemeter systems, Calibration), Quality control, Specifications, Standards, Data.

The specification establishes a standardized procedure for issuing calibration data applicable to telemetering components a procedure is necessary in order that all such data will fulfill the requirements of: uniformity, completeness of data, neatness and clarity, ease of interpretation.
AD-658 141 HC$3.00 MF$0.65

LASA SUBARRAY ELECTRONICS MODULE (SEM) TELEMETRY Q MODIFICATION (SEM MOD 20),
Philco-Ford Corp Billings Mont Education and Technical Services Div
H. L. Martin. 10 May 67, 22p
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

Descriptors: (*Telemeter systems, Design), Modules (Electronics), Power supplies, Electronic equipment, Maintenance, Environmental tests, Installation, Time, Test methods.
Identifiers: LASA.

SEM Mod 20 involved two major changes in the operation of the Subarray Electronics Module (SEM). First, a new Power Distribution and Control Drawer (PDC), Model II, provided for an expansion of the SEM telemetry command responses to a possible sixty-three commands. The report briefly describes the work effort of the Montana LASA Maintenance Center personnel in accomplishing the modification. This consisted of four principal functions: Preliminary work at Lincoln Laboratory, System evaluation at the LMC, Modification and Checkout at the LMC, and Field installation. (Author)
AD-658 180 HC$3.00 MF$0.65

ADMITTANCE OF THE INFINITE CYLINDRICAL ANTENNA IN A LOSSY PLASMA, II. THE INCOMPRESSIBLE, MAGNETOPLASMA SCIENTIFIC REPORT.
Michigan Univ., Ann Arbor. High Altitude Engineering Lab.
E. K. Miller. May 67, 56p NASA-CR-87498, REPT.-05621-11-5
Contract NASR-54/05/

Descriptors: *Antenna field, *Magnetic field, *Plasma sheath, Admittance, Antenna, Circumference, Comparison, Field, Finite, Gain, Gap, Infinite, Loss, Magnetic, Magnetoplasma, Numerical, Plasma, Sheath, Static.

For abstract, see STAR 05 20.
N67-34407 HC$3.00 MF$0.65

ANALYTICAL STUDY OF EQUIPMENTS.
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-34795 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

RESEARCH AND DEVELOPMENT OF MAGNESIUM/ALUMINUM ELECTROFORMING PROCESS FOR SOLAR CONCENTRATORS FINAL REPORT, 13 MAY 1966 - 10 MAY 1967.
Electro-optical Systems, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 20.
N67-34490 HC$3.00 MF$0.65

10B. Power Sources

DESULFURIZATION OF LIQUID HYDROCARBON FUEL FOR FUEL CELLS.
Final technical rept.,
Pratt and Whitney Aircraft East Hartford Conn
Herbert Setzer. 25 Apr 67, 47p Rept no. PWA-3087
Contract DA-44-009-AMC-1446 (T)

Descriptors: (*Fuel cells, Fuels), (*Organic sulfur compounds, Removal), (*Hydrocarbons, Purification), Catalysts, Nickel, Hydrogen, Adsorption, Gas generating systems, Thiophenes.
Identifiers: CITE fuels, JP-4 fuels, Desulfurization.

An experimental evaluation of catalytic guard chamber materials and systems studies were made to select a desulfurization technique and guard chamber catalyst-absorbent. Certain supported nickel catalysts were found effective in the removal of organic sulfur compounds from feed mixtures of fuel and water. The addition of hydrogen to the feed was found to increase the length of time during which sulfur is efficiently removed. Since the useful life of the catalyst-absorbent in the desulfurization cartridge was found to be dependent on such unknown factors as the type and concentration of the sulfur present in the fuel, principles for signaling the end of the useful life of the desulfurization cartridge were investigated. A demonstration test with JP-4 containing 470 ppm of sulfur was run using an existing hydrogen generator modified for operation with a desulfurization cartridge utilizing recycled dilute wet hydrogen. This 200-hour test without loss in performance demonstrates the potential of this method for utilizing JP-4 or CITE in indirect hydrocarbon-air fuel-cell powerplants. (Author)
AD-657 685 HC$3.00 MF$0.65

BASIC PLASMA PROCESSES.
Westinghouse Research Labs Pittsburgh Pa Atomic and Molecular Sciences
For primary bibliographic entry see Field 20I.
AD-657 864 HC$3.00 MF$0.65

RADIATION EFFECTS IN THERMOELECTRICS. 2. PERMANENT AND QUASI-PERMANENT EFFECTS OF PILE BOMBARDMENT ON SEVERAL COMPOUND SEMICONDUCTORS,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 20L.
AD-658 326 HC$3.00 MF$0.65

SAVANNAH RIVER LABORATORY ISOTOPIC POWER AND HEAT SOURCES. PART I.
Quarterly progress rept. Jan-Mar 67,
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
H. S. Hilborn. May 67, 19p
Contract AT (07-1)-1

Descriptors: (*Cobalt alloys, *Rhenium alloys), (*Reactor fuels, *Radioactive isotopes), Heat, Power, Sources.

For abstract, see NSA 21 17.
DP-1105-1 HC$3.00 MF$0.65

SIMULATED SHUNT CAPACITOR SWITCHING TESTS PINNACLE PEAK SUBSTATION, COLORADO RIVER STORAGE PROJECT, MAY 16-21, 1966,
Bureau of Reclamation, Denver, Colo. Electric Power Branch.
R. R. Fillenberg, and G. W. Cleaveland. Feb 67, 109p EP-19

Descriptors: (*Capacitors, *Switching circuits), (*Electric power production, Auxiliary power plants), Transients, Electric cables, Radiofrequency, Oscillation, Circuits, Shielding, Conductivity, Voltage, Coupling circuits, Lead, Copper, Diagrams.

Simulated back-to-back shunt capacitor switching tests were conducted at the 230-kv Pinnacle Peak Substation, using 3 configurations of power circuits to represent the most likely modes of transient power circuit oscillations. Each circuit was impulsed with 20-kv dc to simulate at reduced magnitude transients similar to those expected in actual system capacitor switching. Transients are induced into control circuits by electromagnetic and electrostatic coupling and by radiation. Without control and protective measures, transients of 7.5 kv to ground can be induced into control circuits during switching. Tests were made on plastic sheathed, lead sheathed, and copper mesh shielded control cables. Insertion of 160-ohm resistors during capacitor energization limits transients at the source so original magnitudes in control cables are reduced to about 65% for radio frequency components and about 10% for resonant frequency components. Induced transient voltages can be reduced by: grounding spare conductors at both ends of cable, grounding cable trench covers, shielding control cable with whield grounded at both ends of cable, and connecting a 0.1-mfd capacitor between control cable conductor and ground at control house to drain off radio frequencies. Installation of 2 large ground cables in the control cable trench is also recommended for transient protection. (Author)
PB-175 607 HC$3.00 MF$0.65

10C. Energy Storage

DEVELOPMENT OF MAGNESIUM FLAT CELL BATTERY.
Quarterly rept. no. 4, 1 Feb-30 Apr 67,
Electric Storage Battery Co Madison Wis Ray-O-Vac Div
Philip F. Albert. Aug 67, 50p
ECOM-02136-4
Contract DA-28-043-AMC-02136 (E)
See also AD-651 432.

Descriptors: (*Batteries + components, *Magnesium), (*Primary cells, Magnesium), (*Dry cells, Magnesium), Electrolytes, Magnesium compounds, Bromides, Perchlorates, Anodes (Electrolytic cell), Magnesium alloys, Manganese compounds, Dioxides, Electrical properties, Performance (Engineering), Storage.
Identifiers: Magnesium bromides, Magnesium perchlorate, Magnesium wafer cells, Manganese dioxide.

Delayed capacity performance is tabulated on a series of batteries previously assembled. Graphs are included illustrating the capacity maintenance on the BA-399 and 600 ohms/5 - Continuous drains after various periods of storage at various temperatures. Gas evolution stand test data is presented from immersion of magnesium in electrolyte-manganese dioxide filtrates. An experimentally designed series of batteries was assembled incorporating four variables and three levels of each in an attempt to influence high temperature storage characteristics. (Author)
AD-657 588 HC$3.00 MF$0.65

CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERIES.
Quarterly rept. no. 14, Oct-Dec 66,
Naval Ordnance Lab Corona Calif
Douglas N. Bennion, Michael J. Schaer, and W. C. Spindler. 15 Aug 67, 24p Rept no. NOLC-727
See also AD-648 706.

Descriptors: (*Guided missile batteries, Electrochemistry), (*Electrolytes, *Organic nitrogen compounds), (*Energy conversion, *Information retrieval), (*Batteries + components, *Electrochemistry), Nitrobenzenes, Fuel cells, Electrical conductance, Organic solvents, Sulfoxides, Oxidation-reduction reactions, Spectra (Infrared), Amines, Data processing systems, Subject indexing.
Identifiers: Ammonia-activated batteries, Dimethyl sulfoxide, Dinitro benzenes, KWIC index, Organic batteries.

Investigation of transport parameters of organic nitro-compounds in solution in nonaqueous electrolytes. An experimental system to measure conductivity was completed, and testing of m-DNB in liquid ammonia was begun. Solution conductance reached a maximum as temperature was increased from -60 to -20C. In addition, the solubility of m-DNB in dimethylsulfoxide was determined, and conductivity found to be about 0.001/ohm/cm in a solution saturated with LiCl or LiNO3. Attempts were made to identify by IR spectra the electroreduction products of organic nitro-compounds in acid ammonia solutions. Nitrobenzene undergoes a complete four-electron reduction to phenyl hydroxylamine, as identified by its IR spectrum. However, di-substituted nitrobenzene compounds could not be identified by IR spectra, probably because of side reactions. An information storage and retrieval program based on use of the IBM-1401 computer and an IBM keyword-in-context indexing system is described. This program is used to provide indexes of both reports and PIC briefs in the chemoelectric energy-conversion field. (Author)
AD-658 111 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TPC-2A BIAS BATTERY,

Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1903
Prepared in cooperation with Bendix Aviation Corp., North Hollywood, Calif. Pacific Div.

Descriptors: (*Batteries + components, Quality control), Airborne, Performance (Engineering), Specifications, Test methods, Tests.

The specification includes requirements for: construction, serial numbering, visual inspection, test data, test equipment, tests, and tagging.
AD-658 120 HC$3.00 MF$0.65

DEVELOPMENT OF ONE AMPERE-HOUR HEAT STERILIZABLE SILVER-ZINC CELL FINAL TECHNICAL EVALUATION REPORT, PERIOD ENDING JUN. 1967.
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
A. Himy. Jul 67, 118p NASA-CR-73110, SM-49109-F
Contract NAS2-3819

Descriptors: *Electrochemical cell, *Inorganic coating, *Silver-zinc battery, *Spacecraft sterilization, Battery, Cell, Coating, Cover, Design, Edge, Electrochemical, Fabrication, Heat, Inorganic, Oxide, Pack, Polyphenyl, Primary, Seal, Separator, Silver, Spacecraft, Sterilization, Terminal, Testing, Welding, Zinc.

For abstract, see STAR 05 20.
N67-34069 HC$3.00 MF$0.65

SCREENING OF INORGANIC COMPOUNDS AS SOLVENTS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. F. Leibecki. Aug 67, 23p NASA-TM-X-1427
Contract 120-34-01-09-22

Descriptors: *Electrolyte, *Inorganic compound, *Solvent, Arsenic, Battery, Bromine, Cell, Chloride, Compound, Constant, Dielectric, Fuel, High density, High energy, Hydrazine, Inorganic, Iodine, Measurement, Pentafluoride, Phosphorus, Screening, Selenium, Sulfur, System, Thionyl, Trifluoride.

For abstract, see STAR 05 20.
N67-35115 HC$3.00 MF$0.65

11. MATERIALS

11A. Adhesives and Seals

THE USE AND FUNCTION OF COUPLING AGENTS IN GLASS-REINFORCED PLASTICS.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 13H.
AD-488 385 HC$3.00 MF$0.65

A SIMPLE VACUUM SEAL FOR NON-CIRCULAR TUBES,
Oregon State Univ Corvallis Dept of Chemistry
W. J. Fredericks. 13 Jan 67, 3p
AFOSR-67-2075
Grant AF-AFOSR-217-66
Availability: Published in J. Sci Instrum v44 p561 1967.

Descriptors: (*O-rings, Pipes), Design, Vacuum seals, Deformation, Vacuum furnaces.

A simple O-ring seal for large diameter non-circular tubes is described. The O-ring is forced to conform to the contour of the tube by a deformable backing ring and scaled by a hand nut. (Author)
AD-657 917 Not available from CFSTI.

PRESSURE SEALING CLOSURES FOR FULL PRESSURE PROTECTIVE SUIT ASSEMBLIES.
Northrop Space Labs Hawthorne Calif
For primary bibliographic entry see Field 6Q.
AD-658 204 HC$3.00 MF$0.65

11B. Ceramics, Refractories, and Glasses

HALOGEN COMBUSTION CALORIMETRY OF REFRACTORY COMPOUNDS. THE HEATS OF FORMATION OF BORON NITRIDE AND BORON FLUORIDE,
Fulmer Research Inst Ltd Stoke Poges (England)
P. Gross, C. Hayman, and M. C. Stuart. Mar 62, 14p Rept no. R.163/7
AFOSR-67-1993
Contracts AF 61 (052)-447, DA-91-591-EVC-1316
Availability: Published in Proceedings of the British Ceramic Society n8 p39-50 Jun 1967.

Descriptors: (*Refractory materials, *Heat of formation), (*Boron compounds, Heat of formation), (*Nitrides, Heat of formation), (*Fluorides, Heat of formation), Calorimetry, Combustion, Thermochemistry, Crystal structure, Great Britain.
Identifiers: Boron fluoride, Boron nitride.

A survey is made of calorimetric halogenation techniques and apparatus which have been used in this Institute and which are applicable to the determination of the heats of formation of refractory compounds. A description is given of the determination of the heat of formation of hexagonal boron nitride by combustion in fluorine and of that of boron trifluoride on which the former is based. The values obtained, taking the beta-rhombohedral form as standard state for boron, are: BF3 (g) = -271.2 +0.5 -0.5 kcal; BN (rex.) = -60.2 +0.5 0.5 kcal. (Author)
AD-657 664 Not available from CFSTI.

RELATIVE ENTHALPY OF BERYLLIUM 1:1-ALUMINATE, BeO.Al2O3, FROM 273 TO 1173K. THERMODYNAMIC PROPERTIES FROM 273 TO 2150K,
National Bureau of Standards Washington D C Inst for Basic Standards
David A. Ditmars, and Thomas B. Douglas. 15 Nov 66, 9p
AFOSR-67-2015
Availability: Published in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry v71A n2 p89-95 Apr 1967.

Descriptors: (*Beryllium compounds, Thermal properties), (*Aluminates, Thermal properties), (*Ceramic materials, Thermal properties), Enthalpy, Calorimetry, Specific heat, Oxides, Thermodynamics.
Identifiers: Beryllium aluminates.

The relative enthalpy of the beryllium aluminate BeO.Al2O3 was measured by 'drop' calorimetry from 273 to 1173K. The thermodynamic properties were calculated up to 2150K (approximately the melting point). For this calculation, the data were extrapolated above 1173K and the entropy at 273K previously determined at the NBS, was used. (Author)
AD-657 677 Not available from CFSTI.

RELATIVE ENTHALPY OF BERYLLIUM 1:3-ALUMINATE, BeO.3Al2O3, FROM 273 TO 1173K. THERMODYNAMIC PROPERTIES FROM 273 TO 2150K,
National Bureau of Standards Washington D C Inst for Basic Standards
David A. Ditmars, and Thomas B. Douglas. 15 Nov 66, 9p
AFOSR-67-2016
Availability: Published in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry v71A n2 p97-103 Mar-Apr 1967.

Descriptors: (*Beryllium compounds, Thermal properties), (*Aluminates, Thermal properties), (*Ceramic materials, Thermal properties), Thermodynamics, Enthalpy, Calorimetry, Specific heat, Heat of formation, Oxides.
Identifiers: Beryllium aluminates.

The relative enthalpy of beryllium 1:3-aluminate, BeO.3Al2O3 was measured from 273 to 1173K. Thermodynamic properties were calculated up to 2150K (near the melting point) by extrapolating the present measurements and making them consistent with existing low-temperature data. (Author)
AD-657 678 Not available from CFSTI.

THE HEATS OF COMBUSTION OF POLYTETRAFLUOROETHYLENE (TEFLON) AND GRAPHITE IN ELEMENTAL FLUORINE,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 733 Not available from CFSTI.

THE ZIRCONIA-HAFNIA SYSTEM,
Aerospace Research Labs Wright-Patterson AFB Ohio
Robert Ruh, H. J. Garrett, R. F. Domagala, and N. M. Tallan. 1965, 33p
Presented at the Annual Meeting of the American Ceramic Society (67th), Philadelphia, Pa., 5 May 65, Basic Science Div. nos. 65-B-65 and 68-B-65.
Availability: Published in The Journal of the American Ceramic Society.

Descriptors: (*Ceramic materials, *Phase diagrams), (*Zirconium oxides, Phase studies), (*Hafnium compounds, Phase studies), Oxides, Solid solutions, Metallography, X-ray diffraction analysis, Differential thermal analysis, Crystal structure, Melting point, Thermocouples.
Identifiers: Hafnium oxide.

The ZrO2-HfO2 system was investigated by metallographic, X-ray diffraction, and microprobe analysis using arc melted samples which had been annealed and quenched. The monoclinic-tetragonal inversion in the system was investigated by DTA and high temperature X-ray diffraction analysis. Results of this work reveal that zirconia and hafnia are completely miscible in all proportions in the binary system. Within experimental error, the melting points of the compositions lie roughly on a straight line connecting the melting points of oxides. There is a continuous increase in the monoclinic-tetragonal inversion temperature as the composition moves from ZrO2 to HfO2. The lattice parameters of the monoclinic phase follow smooth curves which have a negative deviation from Vegard's law. (Author)
AD-657 957 Not available from CFSTI.

GROWTH OF SINGLE Ti2O3 CRYSTALS FROM THE MELT.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20B.
AD-657 978 HC$3.00 MF$0.65

A STUDY OF THE ZIRCONIA-HAFNIA SYSTEM.
Summary rept. 1 May 63-30 Apr 64,
IIT Research Inst Chicago Ill Technology Center
R. F. Domagala. Apr 64, 28p Rept no. IITRI-B194-23
Contract AF 33 (616)-7074
See also AD-410 593.

Descriptors: (*Ceramic materials, Phase diagrams), (*Zirconium oxides, Phase studies),

(*Hafnium compounds, Phase studies), Oxides, Solid solutions, Metallography, X-ray diffraction analysis, Differential thermal analysis, Probes, Thermocouples, Crystal structure, Melting point.
Identifiers: Hafnium oxide.

A definitive study of phase relationships in the ZrO2-HfO2 system was conducted. Metallographic, X-ray, differential-thermal, and microprobe analyses were applied to annealed and quenched specimens of arc-melted compositions. The system forms a continuous series of solid solutions in the low-temperature monoclinic structure as well as the high-temperature tetragonal structure. There is a rel tively small intervening monoclinic plus tetragonal two-phase solid solution field. This field lies approximately on a straight line connecting the inversion temperatures of the two oxides. The melting points of ZrO2-HfO2 compositions likewise lie roughly on a line connecting the melting point of each oxide. There are no intervening complex oxides. Effort was also directed toward a better definition of the high-temperature, high-hafnium region of the Hf-O system. This study was brought to a conclusion and a final Hf-O diagram is presented. (Author)
AD-658 041 HC$3.00 MF$0.65

INFLUENCE OF REINFORCING DETAILS ON YIELD LINE PATTERN AND ULTIMATE LOAD-CARRYING OF REINFORCED CONCRETE SLABS,
Army Engineer Waterways Experiment Station Vicksburg Miss
H. G. Geymayer, and J. E. McDonald. Aug 67, 101p Rept no. Miscellaneous Paper-6-911
Availability: Hard copy available from Army Engineer Waterways Experiment Station, Vicksburg, Miss., $1.75.

Descriptors: (*Reinforced concrete, Loading (Mechanics)), Shrinkage, Deflection, Mixtures, Creep, Design, Thickness, Stresses, Measurement, Cracks, Flexural strength.

The objectives of this study were to determine the influence of reinforcing details (i.e. of geometry and number of bent or stopped-off bars, of corner reinforcement, of column strips, ets.) on the yield line pattern and the load-carrying capacity of elementary reinforced concrete slabs, and to test the applicability of the yield line theory to the evaluation of these influences. A total of seven simply supported slabs, 66 by 66 by 1 in. and 60-in. clear-span, with identical (isotropic) midslab reinforcement (p = 0.8%) and various arrangements of bent bars and corner reinforcements, were cast and tested under uniform loads to flexural failure. Two one-way slab strips, 66 by 12 in. by 1 in. and 60-in. span, served to determine the ultimate moment. Rigorous yield line analysis, which took into consideration the effects of common inhomogeneities and anisotropies in the slab reinforcement, was performed for elementary geometries and boundary conditions, and theoretical predictions were compared with experimentally obtained results. The results of the few tests verify the theoretical conclusion that reinforcing details, though generally disregarded in yield line analysis, may have a significant effect upon the crack pattern and the ultimate load-carrying capacity of slabs, and may cause variation of as much as 30% in the flexural strength of the slabs. Yield line analysis procedures, however, are apparently well suited to evaluate these influences, at least for the case of elementary slabs. (Author)
AD-658 293 MF$0.65

DETERMINATION OF OXYGEN IN FLUORIDES AND REFRACTORIES BY INERT GAS FUSION.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
For primary bibliographic entry see Field 7A.
For abstract, see STAR 05 20.
N67-34341 HC$3.00 MF$0.65

HANDBOOK OF OPTICAL PROPERTIES FOR THERMAL CONTROL SURFACES, VOLUME III FINAL REPORT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-34625 HC$3.00 MF$0.65

FEASIBILITY OF DISPERSED PHASE GRAIN REFINEMENT IN CERAMICS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
J. L. Woolfrey. Feb 67, 27p AAEC-E-170

Descriptors: *Ceramics, *Crystal growth, *Particle size, Beryllium, Boundary, Dispersion, Grain, Nucleation, Oxide, Phase, Pore, Rate, Refinement, Stabilization.

For abstract, see STAR 05 20.
N67-34697 HC$3.00 MF$0.65

THERMAL CONDUCTIVITY MEASUREMENTS ON SOLIDS BETWEEN 20 AND 150 DEGREES C USING A COMPARATIVE-LONGITUDINAL APPARATUS RESULTS ON MgO, BeO, ThO2, TH/SUB X/U/SUB 1-X/O/SUB 2-Y/ AND ALUO2 CERMETS,
Oak Ridge National Lab., Tenn.
J. P. Moore, T. G. Kollie, and R. S. Graves. Jun 67, 44p
Contract W-7405-eng-26

Descriptors: (*Thermal conductivity, Measurement), (*Cermets, *Nuclear radiation), Magnesium compounds, Oxides, Thorium compounds, Dioxides, Aluminum, Uranium, Beryllium, Density.

For abstract, see NSA 21 17.
ORNL-4121 HC$3.00 MF$0.65

INVESTIGATION OF SHEAR BEHAVIOR OF PRESTRESSED CONCRETE BRIDGE GIRDERS.
Technical rept.,
Tulane Univ., New Orleans, La. Dept. of Civil Engineering.
David P. Gustafson, and Robert N. Bruce, Jr. Oct 66, 188p TR-101
Prepared in cooperation with Louisiana Dept. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Shear stresses, *Reinforced concrete), (*Bridges, *Beams (Structural)), Design, Failure (Mechanics), Cracks, Accuracy, Bonding, Reinforcing materials, Standards, Tests.

The report presents the results of shear tests on eight prestressed concrete girders and five smaller reinforced concrete beams. The principal variable was the shear reinforcement, including vertical, inclined, and prestressed reinforcement, some bonded, some unbonded. All girders and beams were simply supported and loaded equally at the third points of the span. Seven of the girders failed in shear, one had a transitional failure. Three of the smaller beams failed in shear , two in flexure. Results are compared with AASHO and AC1 design codes. Some of the conclusions of the study were as follows: The shear strength of full size prestressed concrete girders can be predicted with reasonable accuracy from tests on small laboratory specimens. If failure occurs from flexure shear cracking, prestressing the web reinforcement does not add to the ultimate strength of the member. There was no increase in the ultimate shear strength due to inclining the web reinforcement, but the inclined stirrups did tend to better restrain the opening of inclined cracks than did the vertical stirrups. (Author)
PB-175 745 HC$3.00 MF$0.65

A STUDY OF COHESION, FRICTIONAL RESISTANCE, AND INTERLOCKING OF PARTICLES AS BASIC STRENGTH COMPONENTS OF ASPHALTIC CONCRETE.
Final rept.,
South Dakota State Univ., Brookings.
Emil R. Hargett. Jun 67, 41p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Compressive properties), (*Asphalt, Mixtures), Shear stresses, Strain (Mechanics), Particle size, Tensile properties, Friction, Tables, Tests.
Identifiers: Aggregates.

The report is on a laboratory study intended to evaluate the basic strength components of asphaltic concrete mixtures - shearing resistance, cohesion, frictional resistance and interlocking of particles. Direct compression tests at two strain rates, triaxial tests, and tension tests were performed on laboratory molded specimens approximately 5 in. in diam. by 10 in. in height. Both crushed and rounded aggregates were used and the amount of 85-100 grade asphalt was varied from 3.5 to 5.25 percent. The author found that the unconfined compression test can reveal some material properties but should not be used alone for evaluating the basic strength components of mixtures. The results of the triaxial test produced a curved Mohr envelope which the author attributed to loss of particle interlock. Reportedly, the cohesive strength obtained from Mohr envelopes was verified by the results of the tension tests although there was a wide variation in the results. The strain associated with failure in tension was found to be less than that found in compression testing. The report does not state any findings with respect to effects of materials variables or rate of strain. (Author)
PB-175 761 HC$3.00 MF$0.65

RESEARCH ON COMPOSITE SILICATE DENTAL CEMENTS.
Monsanto Research Corp., Everett, Mass. Boston Lab.
For primary bibliographic entry see Field 6E.
PB-175 779 HC$3.00 MF$0.65

STEEL SPIRALS FOR REINFORCED CONCRETE COLUMNS.
National Bureau of Standards, Washington, D. C. Office of Commodity Standards.
For primary bibliographic entry see Field 13M.
PB-175 782 HC$3.00 MF$0.65

ASPHALT CONCRETE COMPACTION STUDIES USING NUCLEAR DEVICES,
California State Div. of Highways.
For primary bibliographic entry see Field 13B.
PB-175 932 HC$3.00 MF$0.65

A STUDY OF CREEP IN LIGHTWEIGHT AND CONVENTIONAL CONCRETES.
Interim rept.,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
M. A. Cassaro. Jan 67, 131p
Prepared in cooperation with Florida State Road Dept. and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Creep), Stresses, Mathematical models, Roads, Instrumentation, Viscoelasticity, Strain (Mechanics), Limestone, Shrinkage, Tests.
Identifiers: Aggregates (Materials).

The report is a laboratory study and the analysis of the creep characteristics of normal and lightweight aggregate concretes. Particular interest was given to differences in the nature of their creep characteristics; the possible influence of specimen shape without size interactions; and the possibility of developing a mathematical model to represent

creep of concrete under any stress history from a single test. In an attempt to clarify the existing theories for the mechanism of creep as they pertain to concretes of the type tested, this study has endeavored to link molecular hypothesis and rheological models with macroscopic observations of the concrete structures under investigation. It is shown that creep behavior may be adequately predicted from macroscopic observations by employing structure parameters in a rheological model. The model is constructed with structure coefficients from statistical mechanics theory which will predict the creep of concrete from a consideration of the response from a test of several specimens sustained at low constant stress. The parameters which are used in this model represent: The rate of transition of the gel from fluid to solid. The total expected change in the structure of the gel. The purely elastic action of the gel and aggregate system. (Author)
PB-175 941 HC$3.00 MF$0.65

STRIPPING IN HOT - MIXED SAND ASPHALT MIXTURES.
Ohio State Univ., Columbus. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-175 954 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
Mar 67, 200p
Contract W-7405-eng-48

Descriptors: (*Ceramic materials, Microstructure), (*Nuclear magnetic resonance, Physical chemistry), Metallurgy, Solid state physics.

For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

11C. Coating, Colorants, and Finishes

PROBLEMS AND SOLUTIONS IN THE FABRICATION OF H-FILM (KAPTON) FLEXIBLE CIRCUITS,
Martin Co., Orlando, Fla.
H. T. Davis. Dec 65, 18p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., Dec 65.

Descriptors: (*Plastic coatings, Manufacturing methods), (*Films, Manufacturing methods), Imides, Mechanical properties, Condensation reactions, Copper, Bonding, Halocarbon plastics, Tensile properties, Soldering, Pressure, Laminates, Adhesives, Embrittlement, Printed circuits, Benzenes, Polymers.

This paper describes the major problem areas encountered in the fabrication of Kapton flexible harnesses. Although not all of these problems have been solved, it is certain that all the areas of concern in the development of advanced flexible harnesses have been identified. Since it is easily predictable that the use of flex harnesses will increase in the near future, it is equally simple to understand the urgency with which the entire field must be handled. (Author)
AD-479 560 HC$3.00 MF$0.65

A NOVEL FORM OF THERMAL BARRIER FOR COMMUNICATIONS CABLES,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 9A.
AD-479 561 HC$3.00 MF$0.65

PROCESSING VARIABLES AND THEIR EFFECT ON THE FINAL PROPERTIES OF POLYETHYLENE CABLE JACKETS,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Plastics Dept.
For primary bibliographic entry see Field 9A.
AD-479 562 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN ETHYLENE-PROPYLENE POLYMERS FOR WIRE AND CABLE APPLICATIONS,
Enjay Labs., Linden, N. J.
For primary bibliographic entry see Field 11I.
AD-479 563 HC$3.00 MF$0.65

POLYSULFONE FOR WIRE AND CABLE,
Union Carbide Corp., New York. Plastics Div.
For primary bibliographic entry see Field 9A.
AD-479 565 HC$3.00 MF$0.65

TAILORING OF HIGH DENSITY POLYETHYLENE FOR HIGH SPEED WIRE COATING,
Army Electronics Command, Fort Monmouth, N. J.
J. N. Scott, C. T. Levett, C. F. Leslie, and J. P. Hogan. 1965, 8p

Descriptors: (*Polyethylene plastics, Plastic coatings), (*Electric wire, *Plastic coatings), Polymers, Tensile properties, Density, Molecular weight, Stresses, Extrusion, Structural properties, Test methods, Dielectrics, Stability, Electric insulation.

The data and discussions included in this paper supplemented by field experience shows that it is possible to produce an excellent high density resin for high speed wire coating. This is achieved by tailoring the resin to definite molecular weight, molecular weight distribution and other structural properties. (Author)
AD-479 567 HC$3.00 MF$0.65

CLAD METALS IN CABLE CONSTRUCTION,
Metals and Controls, Inc., Attleboro, Mass.
For primary bibliographic entry see Field 13H.
AD-479 571 HC$3.00 MF$0.65

INVESTIGATION OF METHODS TO REDUCE ANIMAL DAMAGE TO WIRE AND CABLE,
Bureau of Sport Fisheries and Wildlife, Denver, Colo. Wildlife Research Center.
For primary bibliographic entry see Field 9A.
AD-479 574 HC$3.00 MF$0.65

SURFACE EFFECTS IN THE PHOTODEGRADATION OF POLYMER FILMS.
Interim rept.,
Naval Research Lab Washington D C
Thomas R. Price, and Robert B. Fox. 5 Jul 67, 23p
Rept no. NRL-6563

Descriptors: (*Plastic coatings, *Photolysis), (*Polymers, Photolysis), Ultraviolet radiation, Radiation chemistry, Styrene plastics, Polyvinyl chloride, Polyester plastics, Acrylic resins, Surface properties, Surface tension, Degradation, Oxidation.
Identifiers: Surface chemistry.

The effect of ultraviolet irradiation in air on the wettability of polymer surfaces by liquids of known surface tensions was studied. The polymers studied were polystyrene, poly (vinyl chloride), poly (ethylene terephthalate), poly (methyl methacrylate), and poly (butyl methacrylate). Changes in contact angles of the contact liquids used were plotted versus the time of irradiation of the polymer surface. Spectral evidence is presented to show that photodegradation products include oxygenated moieties capable of interaction with polar liquids. Polymer fragments resulting from chain scission also play an important role in wettability changes for some polymers. Extraction and spectral studies of irradiated polystyrene surfaces showed that photodegradation products include small molecules, readily removed by extraction, and oxidized (as carbonyl) polymer chains which are not readily removed from the surface. (Author)
AD-657 608 HC$3.00 MF$0.65

DETERMINATION OF CALCIUM CARBONATE IN MIXED PAINT PIGMENTS BY A NEW, SPECIFIC, TITRIMETRIC TECHNIQUE.
Final rept.,
Army Coating and Chemical Lab Aberdeen Proving Ground Md
Melvin H. Swann. Aug 67, 11p Rept no. CCL-235

Descriptors: (*Pigments, Volumetric analysis), (*Calcium compounds, Pigments), (*Carbonates, Pigments), Paints, Test methods, Lithium fluorides.
Identifiers: Calcium carbonate.

There is no method of analysis that is specific for calcium carbonate in paint pigments and all quantitative methods are relatively tedious and time-consuming. A simple, volumetric technique is described in which the carbonate is titrated with normal acid after reaction with lithium fluoride. There is no interference from any of the other paint pigments, except the chromates. (Author)
AD-658 075 HC$3.00 MF$0.65

A METHOD FOR COATING MADDIDA MAGNETIC MEMORY DRUMS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
C. Dixon Smith, and I. B. Irving. 1 Apr 53, 7p
Rept no. CF-1993

Descriptors: (*Coatings, Magnetic materials), (*Computer storage devices, Coatings), Aluminum, Manufacturing methods.

A technique was developed for applying a smooth coating of a magnetic dispersion to an aluminum drum used as a magnetic memory for a maddida unit. The finished unit is free from flaws such as 'alligatoring' and has a coating thick enough to give a 0.7 volt a.c. electrical output when the recording is made with a 300 turn winding recording head and a 50 ma. d.c. input current. (Author)
AD-658 092 HC$3.00 MF$0.65

THERMAL-SHOCK RESISTANCE FOR BUILT-UP MEMBRANES.
Building Science Series,
National Bureau of Standards, Washington, D. C. Building Research Div.
William C. Cullen, and Thomas H. Boone. 21 Aug 67, 19p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.15.

Descriptors: (*Roofs, *Bituminous coatings), Shock resistance, Thermal shock, Membranes, Performance (Engineering), Life expectancy, Reinforcing materials, Textiles, Failure (Mechanics), Force (Mechanics).

The resistance of bituminous built-up roofing membranes to thermally induced forces is considered in terms of their strength properties such as breaking load in tension, modulus of elongation and apparent linear thermal expansion coefficient. The development of a Thermal-Shock Resistance Factor is described and values are given for three bituminous built-up membranes at temperatures of -30F (-34.4C) OF (-17.8C), 30F (-1.1C) and 73F (22.8C). The apparent relation between the values obtained in the laboratory and the observed performance of roofing membrances in service is considered. The utilization of the Thermal-Shock Resistance Factor in the reduction of potential failures of bituminous built-up roofing membranes in service from thermally induced forces is also discussed. The assignment of a service life to a bituminous built-up roofing system is frequently dif-

ficult because of the many variables involved. Some of the factors such as breaking load in tension, modulus of elongation, and apparent linear thermal expansion coefficient of roofing membranes of different composition are given for both laboratory-prepared and field-obtained samples. Membranes of 2, 3, and 4-plies of felt are included. The relations of some engineering properties of a roofing membrane to performance in service as expressed by a Thermal-Shock Resistance Factor are also given. Ways and means to reduce potential failures of bituminous built-up roofing membranes resulting from thermally induced forces are discussed. (Author)
NBS-BSS-9 HC$0.15 MF$0.65

THE EFFECT OF VISCOSITY OF ASPHALT ON THE PROPERTIES OF BITUMINOUS PAVING MIXTURES. PART I. HARDENING OF ASPHALT IN HOT BITUMINOUS BASE, BINDER, AND SAND MIXTURES.
North Carolina State Univ., Raleigh. Highway Research Program.
For primary bibliographic entry see Field 13B.
PB-175 788 HC$3.00 MF$0.65

THE EFFECT OF VISCOSITY OF ASPHALT ON THE PROPERTIES OF BITUMINOUS PAVING MIXTURES. PART II. EARLY HARDENING OF ASPHALT IN HOT BITUMINOUS PAVING MIXTURES.
North Carolina State Univ., Raleigh. Highway Research Program.
For primary bibliographic entry see Field 13B.
PB-175 789 HC$3.00 MF$0.65

11D. Composite Materials

EXPERIMENTAL STRAIN ANALYSIS OF COMBINATION ADHESIVES/BOLT LAP JOINTS BETWEEN GLASS-REINFORCED PLASTIC LAMINATES.
Technical rept.,
Picatinny Arsenal, Dover, N. J. Feltman Research Lab.
Julius I. Gnapp. Aug 65, 32p
PA-TR-3131

Descriptors: (*Reinforced plastics, *Joints), (*Laminates, Joints), Adhesives, Mechanical fasteners, Strain (Mechanics), Nylon, Epoxy plastics, Tensile properties, Shear stresses, Bolted joints, Bonded joints.

An investigation was conducted of combination adhesive/bolt lap joints between glass-reinforced epoxy laminate panels bonded with a nylon-modified epoxy adhesive. Its purpose was to ascertain whether a combination of adhesives with mechanical fasteners would provide lap joints of significantly greater static strength than could be obtained by the use of either adhesives or mechanical fasteners separately. The strain distribution around a hole in an adhesive lap joint under tensile load was measured with electrical resistance strain gages bonded to the adherends. This distribution was compared to a similarly obtained strain distribution for a hole in a single panel of the same laminate. The two distributions were found to be almost identical, indicating that the presence of an adhesive does not reduce the stress concentration around a bolt hole and should not, therefore, be expected to strengthen bolted joints that tend to fail in tension across the weakened hole section. The fracture loads and modes of failure of an adhesive lap joint were compared with those of a similar adhesive lap joint 'reinforced' with bolts at the ends. This comparison revealed that the bolt holes were reducing excessively the critical area at the ends of the joint, where most of the resistance of the lap joint must be concentrated, and were actually reducing the strength of the joint. Such a result indicates that mechanical reinforcements requiring holes at the ends of an adhesive lap joint cannot be expected to increase the static strength of the joint. (Author)
AD-467 942 HC$3.00 MF$0.65

FABRICATION TECHNIQUES FOR HIGH PERFORMANCE COMPOSITE MATERIALS.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 13H.
AD-488 380 HC$3.00 MF$0.65

CRACK THEORY AND STRESS ANALYSIS OF COMPOSITE SYSTEMS.
Literature survey, 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, Donald F. Siegmund, and John D. Calfee. 10 Sep 65, 77p HPC-65-2
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Fracture (Mechanics), Theory), (*Stresses, *Composite materials), (*Bibliographies, Fracture (Mechanics)), Photoelasticity, Fibers, Filaments, Laminates, Reviews, Elasticity.

The theoretical aspects of crack theory, stress analysis, and photoelasticity are covered by this literature survey. Included are references to analysis of stresses in composite systems and stresses about solid inclusions and flaws. (Author)
AD-488 381 HC$3.00 MF$0.65

RHEOLOGY OF FILLED SYSTEMS.
Literature survey, 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, William J. Calvin, and John D. Calfee. 31 Aug 65, 28p HPC-65-3
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Rheology, *Composite materials), (*Bibliographies, Rheology), Shear stresses, Viscosity, Spheres, Glass, Particles.

This is a preliminary listing of references to literature concerned with the rheology of filled systems. Only a superficial attempt has been made to relate this information to the study of composites. The abstracts are those published in the abstracting services or those appearing with the original publication. (Author)
AD-488 382 HC$3.00 MF$0.65

SURFACE ENERGY.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, William J. Calvin, and John D. Calfee. 31 Aug 65, 40p HPC-65-4
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Surface properties, Energy), (*Composite materials, Surface properties), Surface tension, Solids, Liquids, Adhesion, Surface-active substances, Bibliographies, Anisotropy, Bonding, Glass, Metals, Liquid metals.

This is a literature survey of methods of measuring the surface energy of solids. Chemical abstracts 1961 - 1964 were used. A brief discussion of the problem is included. (Author)
AD-488 383 HC$3.00 MF$0.65

TAPES AND RIBBONS IN COMPOSITES.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, Richard A. Landy, and John D. Calfee. 31 Aug 65, 57p HPC-65-5
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Composite materials, *Microstructure), (*Reinforcing materials, Composite materials), Tapes, Bibliographies, Mica, Metal plates, Glass, Mathematical analysis, Fibers, Graphics, Tensile properties, Laminates, Defects (Materials), Penetration, Corrosion resistance, Coatings, Elasticity, Thickness, Optical properties, Metalorganic compounds, Compressive properties, Density.
Identifiers: Ribbons.

Two-dimensional microstructures, e.g., flakes, plates, tapes and ribbons, offer unique properties as reinforcements for composite materials. There is little reported work in this area. The majority of the references are to glass, mica, and metal flakes which have been examined for electrical uses. Fabrication methods for glass flakes have received the most emphasis from industry. A few papers dealing with tapes and ribbons are cited.
AD-488 384 HC$3.00 MF$0.65

THE USE AND FUNCTION OF COUPLING AGENTS IN GLASS-REINFORCED PLASTICS.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 13H.
AD-488 385 HC$3.00 MF$0.65

EXPERIMENTAL DATA TO SUPPORT EXISTING THEORIES ON THE PHYSICAL AND MECHANICAL PROPERTIES OF COMPOSITE MATERIALS.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, J. Ross Vincent, and John D. Calfee. 31 Aug 65, 26p HPC-65-7
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Composite materials, Mechanical properties), (*Bibliographies, Composite materials), Physical properties, Theory, Stresses, Adhesives, Production, Test methods.

The purpose of the literature search was to find experimental data to support the existing theories on the physical and mechanical properties of composite materials. A brief bibliography has been compiled from citations in chemical abstracts, 1960 - 1964. (Author)
AD-488 386 HC$3.00 MF$0.65

FIBERS FOR HIGH PERFORMANCE COMPOSITES.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11E.
AD-488 387 HC$3.00 MF$0.65

SURFACE MIGRATION OR DIFFUSION OF GASES OR LIQUIDS ALONG SOLID INTERFACES.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, Michael J. Farrell, Jr., and John D. Calfee. 31 Aug 65, 61p HPC-65-9
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Gases, Diffusion), (*Liquids, Diffusion), (*Surfaces, Adsorption), (*Composite materials, Adsorption), (*Adsorption, *Bibliographies), Interfaces.
Identifiers: Surface migration.

The literature contains little information on surface diffusion along the interfaces in composite materials. Publications concerned with surface diffusion, wettability, chemical compatibility, surface and interfacial energies which are applicable to migration along the interface cited. It is evident that a need exists for more work in this area. This survey covers the years 1947 - 1965. (Author)
AD-488 388 HC$3.00 MF$0.65

THE RHEOLOGY OF FIBROUS MATERIALS IN LOW VISCOSITY MEDIA.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11E.
AD-488 389 HC$3.00 MF$0.65

EFFECT OF FREEZING RATE CHANGES ON THE MEAN COMPOSITION OF BINARY COMPOSITES,
Aerospace Corp El Segundo Calif Labs Div
W. R. Wilcox. Jun 67, 9p Rept no. TR-1001 (2250-10)-11
SSD-TR-67-129
Contract AF 04 (695)-1001

Descriptors: (*Composite materials, Freezing), Eutectics, Interfaces, Reaction kinetics.

Exact analytical expressions have been found for the compositional changes caused by a sudden change in the freezing rate of an off-eutectic melt. These show that the previous numerical results of Mollard and Flemings are slightly in error for a short distance following the freezing rate change. (Author)
AD-657 765 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATIONS ON THE DYNAMIC STRENGTH OF COMPOSITES,
Technion - Israel Inst of Tech Haifa Material Mechanics Lab
S. R. Bodner, and J. M. Lifshitz. Jun 67, 39p Rept no. Scientific-5, MML-8
AFOSR-67-1983
Contract AF 61 (052)-951

Descriptors: (*Composite materials, *Mechanical properties), Viscoelasticity, Quartz, Particles, Epoxy plastics, Strain (Mechanics), Fracture (Mechanics), Tensile properties.

A number of experimental techniques for investigating various dynamic properties of composite materials are reviewed. In order to study filler-binder interaction during straining, especially the onset of unbonding, an apparatus was developed for the continuous measurement of the dynamic modulus and damping during constant rate of strain tests. The relation of changes in the dynamic modulus and damping to the development of failure mechanisms is discussed. Various methods of dynamic viscoelastic characterization and strength determination are reviewed. These include stress wave techniques for the investigation of the fracture strength at high loading rates. The various experiments were performed on samples of an unfilled and quartz particle filled epoxy resin. The results of these studies are also reported. (Author)
AD-657 820 HC$3.00 MF$0.65

EXAMINATION OF FRACTURE SURFACES BY SCANNING ELECTRON MICROSCOPY,
Monsanto Research Corp St Louis Mo
John D. Fairing, and John D. Calfee. 23 Mar 67, 6p Rept no. HPC-67-22
Contract N00014-67-C-0218, ARPA Order-356
Report on Monsanto/Washington Univ., ARPA Association project development of High Performance Composites.
Availability: Published in Journal of Composite Materials v1 n2 p208-10 Apr 1967.

Descriptors: (*Fracture (Mechanics), Electron microscopy), (*Composite materials, Fracture (Mechanics)), Surfaces, Microstructure, Reinforced plastics, Glass textiles, Silicon carbides, Whiskers (Crystals), Interfaces, Failure (Mechanics), Cracks, Reinforcing materials.

Investigations were made of fracture surfaces of composites with the electron scanning microscope which show that failure occurs at (or indistinguishably near) the matrix-reinforcement interface in the majority of systems studied. Interfacial failures are common to a variety of polymeric matrix-inorganic filler systems, and occur with fibrous, particulate and continuous filament reinforcements. Interfacial failure is characterized by a fracture surface exhibiting one or more of the following features: (1) large areas of exposed denuded reinforcing material, (2) thin cracks between reinforcement and matrix normal to the intersection of the reinforcement and the fracture surface, and (3) clear 'mold' marks in the polymer where the reinforcement has been removed; these marks reproduce the surface of the filler and lack the usual features which characterize a cohesive failure in a polymer. Interfacial failures are illustrated. The first is the tensile fracture surface of a polymer reinforced with silicon carbide whiskers and the second is a similar surface of a discontinuous glass fiber reinforced system.
AD-657 863 Not available from CFSTI.

CARBIDE-GRAPHITE COMPOSITES. SECOND PROGRESS REPORT,
Los Alamos Scientific Lab., N. Mex.
K. V. Davidson, R. E. Riley, and J. M. Taub. 26 Sep 66, 15p
Contract W-7405-eng-36

Descriptors: (*Composite materials, Chemical analysis), (*Carbides, *Graphite), Microstructure, Deformation.
For abstract, see NSA 21 17.
LA-3652 HC$3.00 MF$0.65

MECHANISMS OF STRENGTHENING AND FRACTURE IN COMPOSITE MATERIALS PROGRESS REPORT, 1 DEC. 1966 - 1 JUN. 1967.
Stanford Univ., Calif. Dept. of Materials Science.
A. S. Tetelman. Jun 67, 8p NASA-CR-87797, PR-6
Grant NSG-622

Descriptors: *Composite material, *Fracture mechanics, Alloy, Base, Composite, Crack, Dislocation, Distribution, Drill, Effect, Elastic, Eutectic, Fiber, Fracture, Hole, Iron, Material, Mechanics, Mechanism, Notch, Phase, Plastic, Quenching, Steel, Strength, System, Tempering, Toughness, Two.

For abstract, see STAR 05 20.
N67-34533 HC$3.00 MF$0.65

CARBON FIBRE REINFORCED PLASTICS - AN INITIAL EVALUATION.
Royal Aircraft Establishment, Farnborough (England).
L. N. Phillips. Apr 67, 33p RAE-TR-67088

Descriptors: *Fiber strength, *Material testing, *Reinforced plastic, Application, Bonding, Carbon, Composite, Evaluation, Fiber, High modulus, High strength, Material, Mechanical, Physical, Plastic, Polymer, Reinforced, Resin, Stiffness, Strength, Testing.

For abstract, see STAR 05 20.
N67-34684 HC$3.00 MF$0.65

11E. Fibers and Textiles

FIBERS FOR HIGH PERFORMANCE COMPOSITES.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, W. C. Peterson, and John D. Calfee. 31 Aug 65, 93p HPC-65-8
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Fibers, Composite materials), Reinforcing materials, Ceramic fibers, Graphite, Glass, Carbon, Bibliographies, Silicones, Mechanical properties, Metallic textiles, Plastics, Asbestos, Refractory materials, Coatings, Polymers, Temperature.

The present state-of-the-art and the future promise of fibers for use in high performance composites are discussed. The literature survey, which covers the period from 1957 to August 1965, inclusive, contains 235 references with abstracts. (Author)
AD-488 387 HC$3.00 MF$0.65

THE RHEOLOGY OF FIBROUS MATERIALS IN LOW VISCOSITY MEDIA.
Literature survey 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte, M. Bower, Michael K. Collins, and John D. Calfee. 18 Mar 66, 23p HPC-66-10
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Deformation, *Fibers), (*Bibliographies, Fibers), Composite materials, Viscosity, Liquids, Laminar flow, Paper, Rheology.
Identifiers: Paper pulp.

The results of a literature search of the field of the rheology of fibrous materials in low viscosity media are presented. Low viscosity was defined as any viscosity less than or equal to that of water. Thirty references with abstracts are given. (Author)
AD-488 389 HC$3.00 MF$0.65

THE EFFECT OF SOLVENTS ON SOME PROPERTIES OF COTTON CELLULOSE,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
D. M. Wiles, J. D. Cooney, and B. A. Gingras. 12 Dec 66, 9p
NRC-9502
Availability: Published in Textile Research Journal v37 n6 p476-83 June 1967.

Descriptors: (*Cotton textiles, Solvents), (*Cellulose, Molecular structure), (*Fibers (Natural), *Photolysis), Pyridines, Amines, Textiles, Physical properties, Mechanical properties, Molecular association, Degradation, Canada.
Identifiers: Methyl amines.

Samples of cotton duck were immersed in pyridine, aqueous methylamine solutions, and a variety of other solvents. Pyridine and methylamine caused swelling of the cellulose fibers and an increase in the moisture content of the fabric. Pyridine also increased the fabric breaking strength. This is explained in terms of enhanced plasticization by pyridine and water molecules which are hydrogen-bonded to cellulose. Treatment by pyridine or aqueous methylamine reduced the rate of photochemical degradation of fabric samples exposed in a Weather-Ometer. An explanation for this is based on the changes these solvents caused in the fiber structure, e.g., less dense packing of cellulose chains in the swollen fibers. It is suggested that swollen fibers absorb less of the incident light from a carbon-arc and dissipate more of the absorbed energy without chain scission. (Author)
AD-657 697 Not available from CFSTI.

SUMMARY OF SPECIFICATION REQUIREMENTS FOR MILITARY FABRICS.
Technical rept.
Army Natick Labs Mass Clothing and Organic Materials Div
Jul 67, 326p
USA-NLABS-TR-68-9-CM, C/OM-TS-102-Rev
Superseded AD-153 685.

Descriptors: (*Textiles, Military requirements), Performance (Engineering), Cordage, Fibers, Specifications, Test methods, Finishes + finishing, Tables, Quality control.

Specification requirements for military fabrics and related military textile materials such as felts and cordage are summarized in tables which give details for yarn, texture, finish and key performance parameters. Included are finishing, after-treatment specifications and test methods. (Author)
AD-658 048 HC$3.00 MF$0.65

SEALING OF SEAMS AND HYDROSTATIC TEST REQUIREMENTS IN SPECIFICATIONS.
Technical rept.,
Army Natick Labs Mass Clothing and Organic Materials Div

Frank H. Babers. Apr 67, 54p Rept no. C/OM-35
USA-NLABS-TR-67-89-CM

Descriptors: (*Textiles, Moistureproofing), (*Moistureproofing, Hydrostatic tests), Coatings, Specifications, Military requirements, Sealing compounds.

Hydrostatic tests are used to determine the degree of waterproofness of water-repellent-treated fabrics, coated fabrics and items made therefrom. Water-repellent-treated fabrics and seams in coated fabrics are usually evaluated by the Suter test which measures the pressure in inches of water, while the continuity of coating in coated fabrics is measured by the Mullen test which utilizes pressures from 20 to 400 pounds per square inch. The specification requirements were adopted, based on numerous laboratory reports and standard commercial practices. Included in the report are lists of specifications using the tests, laboratory reports correlating rainroom tests with laboratory data, and reports from commercial outfits requiring the tests. The validity of the tests is considered to have been established. (Author)
AD-658 061 HC$3.00 MF$0.65

EFFECTS OF DYNEL FIBER BLENDING ON YARN SHRINKAGE AND WOVEN-FABRIC PROPERTIES.
Technical rept.,
Lowell Technological Inst Research Foundation Mass
Paul J. Angelo, Jr., David H. Pfister, John A. Goodwin, and Victor Duxbury. Jan 67, 71p
USA-NLABS-TR-67-64-CM, C/OM-TS-150
Contract DA-19-129-AMC-894 (N)

Descriptors: (*Fibers (Synthetic), Shrinkage), (*Textiles, Physical properties), Tensile properties, Loading (Mechanics), Moistureproofing, Ventilation, Air, Permeability, Weaving.

Regular and high shrink Dynel were blended in varying proportions and patterns and spun into 16 (s) yarns with two twists. Microscopic examination showed semblances of expected groupings, but the high shrink fibers tended to migrate to the outside. Shrinkages of the yarns in water (200F) were measured under varying tensions. Minor loading reduced shrink ges to low levels, suggesting that mechanics of shrinkage in free yarn are different than those in fabric. There was little correlation of the yarn shrinkage results with the different combinations. Maximum shrinkage occurred in the 50/50, low-twist, draw-frame yarn with alternate feed. The least shrinkage in blended yarns was in low-twist yarns with greater proportions of high-shrink fiber. A 50/50 picker blend warp was woven with fillings from the various blends and twists. The fabrics were scoured and treated for water repellency. Highest shrinkage in scouring occurred with low-twist fillings while final shrinkage showed the reverse. High-twist filling yarns produced less air permeability. Differences in shrinkage and air permeability among various blend arrangements were not significant. There was little correlation among the results of yarn and fabric shrinkage and air permeability. All water repellency tests were poor; fabrics with low-twist fillings were better than those of high twist. Overall, among blended yarns the 50/50 pair arrangements with one drawing seemed more favorable and distinctly better than the 50/50 picker blend. (Author)
AD-658 062 HC$3.00 MF$0.65

STUDIES AND EXPERIMENTAL INVESTIGATIONS IN CONNECTION WITH CHEMICAL BONDING IN RESIN-TREATED CELLULOSE.
Final rept.,
Textile Research Ins Princeton N J
H. D. Weigmann, Robert F. Schwenker, Jr., and John J. Willard. 15 May 67, 103p
USA-NLABS-TR-68-15-PR
Contract DA 19-129-AMC-23 (X)

Descriptors: (*Cotton textiles, *Preservation), (*Cellulose, Chemical bonds), (*Amino plastics, Chemical bonds), Degradation, Inhibition, Chemical analysis, Molecular structure, Microscopy, Solubility, Crosslinking (Chemistry), Chromatographic analysis.
Identifiers: Methylolmel mines.

The nature of the interactions between methylolmelamine resins and cotton was investigated. A new chemical analytical method for the elucidation of the chemical structure of resin-treated cotton was developed. Data are presented for the degree of substitution of cellulose by trimethylolmelamine, and for the distribution of these substituents between the various hydroxyl groups of the anhydroglucose unit under various curing conditions. It was shown by an investigation of weathered resin-treated cotton samples that periodate oxidation can be used as a sensitive index of the structural changes occurring during resin degradation. Microscopy and solubility studies in the cellulose solvent cadoxen, in connection with Smith degradations, were found to provide a method for assessing any cellulose chemical treatment for uniformity and effectiveness of covalent cross-linking. Preliminary results are presented on the distribution of resin substituents along the cellulose chain, and considerable nonuniformity of resin substitution is indicated. (Author)
AD-658 173 HC$3.00 MF$0.65

STANDARD REFERENCE MATERIALS: RECOMMENDED METHOD OF USE OF STANDARD LIGHT-SENSITIVE PAPER FOR CALIBRATING CARBON ARCS USED IN TESTING TEXTILES FOR COLORFASTNESS TO LIGHT,
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
For primary bibliographic entry see Field 11L.
NBS-MISC-PUB-260-15 HC$0.20 MF$0.65

11F. Metallurgy and Metallography

POTENTIODYNAMIC INVESTIGATION OF THE CORROSION OF IRON.
Technical note,
Naval Civil Engineering Lab., Port Hueneme, Calif.
Howard A. Porte. 21 Sep 64, 16p NCEL-TN-625

Descriptors: (*Iron, *Corrosion), Electrodes, Polarization, Sulfuric acid, Voltage, Potentiometers, Electric motors, Anodes.

The anodic polarization of iron in sulfuric acid was investigated by the potentiodynamic method. Polarization was performed with an electronic potentiostat which was programmed by a synchronous motor. The effects of potential traverse rate and direction, and electrode pre-treatment are discussed. (Author)
AD-450 221 HC$3.00

ANODIC BEHAVIOR OF TITANIUM AND ITS ALLOYS IN SULFURIC ACID.
Technical rept.,
Army Materials Research Agency Watertown Mass
Milton Levy. May 67, 25p Rept no. AMRA-TR-67-16

Descriptors: (*Titanium, Electrochemistry), (*Titanium alloys, Electrochemistry), Sulfuric acid, Aluminum alloys, Vanadium alloys, Tin alloys, Oxidation-reduction reactions, Reaction kinetics, Physical chemistry, Polarization, Microstructure, X-ray diffraction analysis, Electrolytic cells, Corrosion, Chromium alloys, Corrosion inhibition.

The electrochemical behavior of titanium and its alloys was studied in sulfuric acid media. Electronic potentiostatic anodic polarization techniques were employed. The anodic behavior of titanium was related to the parameters of temperature; acid concentration; chloride, iron, and copper additions to the electrolyte; yield strength level; microstructure of the alloy; and the use of passivating inhibitors. (Author)
AD-657 557 HC$3.00 MF$0.65

EFFECT OF FREEZING RATE CHANGES ON THE MEAN COMPOSITION OF BINARY COMPOSITES,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 11D.
AD-657 765 HC$3.00 MF$0.65

STUDY OF THE EFFECT OF LIQUID ENVIRONMENT ON THE EMBRITTLEMENT OF SOLIDS.
New York Univ N Y Research Div
For primary bibliographic entry see Field 7D.
AD-657 854 HC$3.00 MF$0.65

A RESEARCH STUDY ON INTERNAL CORROSION OF HIGH PRESSURE BOILERS.
Final progress rept.,
Combustion Engineering Inc Windsor Conn Kresinger Development Lab
P. Goldstein. Sep 67, 30p Rept no. 3
Contract NObs-92280
Presented at Joint Power Generation Conference ASME-IEEE, Detroit, Mich., 24-28 Sept 67. See also AD-623 596, rept. no. 1.

Descriptors: (*Boiler tubes, *Corrosion), Boilers, Feed water, Contamination, Fouling, Sea water, Tests.

The tests discussed by this report were designed to study the effects of both fresh water and seawater condenser leakage upon the corrosion of boiler tubing fouled with preboiler corrosion products. These runs were made with three types of boiler water treatment and the same severe heat transfer conditions previously employed.
AD-657 865 HC$3.00 MF$0.65

THE CORROSION BEHAVIOR OF STAINLESS STEELS IN SEA WATER.
Memorandum rept.,
Naval Research Lab Washington D C
M. H. Peterson, and T. J. Lennox, Jr. Jun 67, 33p Rept no. NRL-MR-1795

Descriptors: (*Corrosion, Stainless steel), (*Stainless steel, Sea water), Cathodic protection, Exposure, Surface properties, Photographs, Corrosion-resistant alloys, Environmental tests.

The corrosion behavior of several series of stainless steels is discussed. Photographs of typical attack in both experimental panels and operational equipment are shown. Because of the susceptibility of stainless steel to pitting, its use in sea water should be avoided in new designs. The 300 series, however, may be used if provided with cathodic protection. The 400 series stainless steels are unsuitable for use in sea water even if provided with cathodic protection. (Author)
AD-657 938 HC$3.00 MF$0.65

QUANTITATIVE DETERMINATION OF ADMIXTURES IN MOLYBDENUM. SPECTRAL AND ANALYTICAL DETERMINATION OF ADMIXTURES IN TUNGSTEN PREPARATES,
Foreign Technology Div Wright-Patterson AFB Ohio
M. E. Britske, A. N. Bronshtein, E. B. Gerken, L. N. Filimonov, and N. A. Makulov. 7 Nov 60, 25p Rept no. MCL-635
TT-61-19920
Trans. of mono. Vsesoyuznoe Soveshchanie Spektroskopistov - Analitikov Tsvetnoi Metallurgii, n.p., 1957 p9-18, 19-28. The All-Union Conference of Analytical Spectroscopists in Nonferrous Metallurgy (2nd), 1957 (Selected Articles).

Descriptors: (*Refractory metals, Spectroscopy), (*Molybdenum, Spectroscopy , (*Tungsten, Spectroscopy), Quantitative analysis, Spectrometers, Standards, Powder metals, Castings, Tungsten compounds, Oxides, Ammonium compounds, Tungstates, Impurities, Microanalysis, USSR.
Identifiers: Ammonium tungstates, Tungsten oxides, Tungstic acids.

The first paper reports researches directed to assuring the required precision of determinations of impurities in Mo, which in this case were 0.0001% for tin, lead, bismuth and antimony, and 0.001% for zinc, copper, arsenic, chromium, titanium and nickel. The second paper describes quantitative determinations of tin, bismuth, lead, cadmium, antimony, copper, nickel, arsenic, zinc, chromium, titanium, magnesium, silicon, iron, aluminum in a relatively pure tungsten preparates. The metallic tungsten in the form of moldings and powder, the WO3 tungsten andydrite, the H2WO4 tungstic acid, and the (NH4)2WO4 ammonium paratungstate are included among them.
AD-657 958 HC$3.00 MF$0.65

THROUGH-THICKNESS NOTCH DUCTILITY AND TENSION PROPERTIES AS A FUNCTION OF NEUTRON EXPOSURE TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL.
Final rept.,
Naval Research Lab Washington D C
Charles Z. Serpan, Jr., and J. Russell Hawthorne.
30 Jun 67, 18p Rept no. NRL-6575

Descriptors: (*Steel, *Radiation damage), Pressure vessels, Ductility, Embrittlement, Notch sensitivity, Tensile properties, Neutron reactions, Power reactors, Light water reactors, Thickness.
Identifiers: Steel A302-B.

Notch ductility and tension-property measurements have been made using specimens irradiated within a large steel test assembly simulating the pressure-vessel wall of a light-water-moderated power reactor. The A302-B steel specimens, spaced at intervals through the 6-in. thickness of the assembly, showed the greatest embrittlement and tensile property changes from irradiation locations nearest the fuel core, and correspondingly smaller changes farther from the core. Measured neutron fluxes of energies greater than 1 MeV, based upon an assumed fission spectrum, compared well with calculated spectrum neutron fluxes of energies greater than 1 MeV for all test assembly locations, thus providing the basis for future estimates of property changes through the thickness of heavy-walled reactor pressure vessels. (Author)
AD-658 019 HC$3.00 MF$0.65

USE OF THE ELLIPSOMETER IN THE MEASUREMENT OF THIN FILMS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 14B.
AD-658 063 HC$3.00 MF$0.65

IMPROVED INSTRUMENTAL METHODS FOR RAPID ANALYSIS OF STAINLESS AND MARAGING STEELS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 14B.
AD-658 074 HC$3.00 MF$0.65

AN X-RAY DIFFRACTION STUDY OF POLYCRYSTALLINE BRASS DEFORMED IN TENSION.
Technical rept.,
Martin Co Orlando Fla
H. M. Otte, and R. P. I. Adler. Feb 67, 47p Rept no. TR-18, OR-8745
Contract Nonr-3706 (00)

Descriptors: (*Brass, X-ray diffraction analysis), Deformation, Copper alloys, Zinc alloys, Crystal lattice defects, Energy.

An X-ray diffraction study of a polycrystalline Cu-30 Zn tensile test piece shows the equilibrium stacking fault energy to be between 8.4 and 12.5 ergs/cm2, in fairly close agreement with previously published results based on transmission electron microscopy techniques. (Author)
AD-658 098 HC$3.00 MF$0.65

ADSORPTION-INDUCED BRITTLE FRACTURE IN LIQUID METAL ENVIRONMENTS.
Martin Co Baltimore Md Research Inst for Advanced Studies
For primary bibliographic entry see Field 20K.
AD-658 210 HC$3.00 MF$0.65

THE SYSTEM NEODYMIUM - MANGANESE (STRUCTURES, MAGNETIC PROPERTIES, PHASE DIAGRAM), THE PHASE DIAGRAMS Yb-Hg AND Tb-Hg,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
Franz Lihl. 20 Jun 67, 35p Rept no. Scientific-2
Contract AF 61 (052)-942

Descriptors: (*Magnetic materials, Intermetallic compounds), (*Intermetallic compounds, Phase studies), (*Rare earth elements, Intermetallic compounds), Neodymium alloys, Ytterbium, Terbium, Manganese alloys, Mercury alloys, X-ray diffraction analysis, X-ray spectroscopy, Differential thermal analysis, Phase diagrams, Magnetic properties, Crystal structure, Metallography, Austria.
Identifiers: Terbium alloys, Ytterbium alloys.

The system Nd-Mn was investigated by X-ray diffraction, X-ray fluorescence analysis, differential thermal analysis and magnetic analysis. The phases present were determined and their structures established: Nd6Mn23 possesses the Th6Mn23, NdMn12 the ThMn12 structure. The magnetic properties of NdMn2, Nd6Mn23 and NdMn12 could be evaluated. Nd6Mn23 is ferromagnetic. NdMn12 is antiferromagnetic. By measurements of the magnetization and of the susceptibility the mu- and mu (eff)-values could be determined. By differential thermal analysis and by the amalgam process the systems Tb-Hg and Yb-Hg could be evaluated. The phases TbHg, TbHg2, TbHg3, YbHg, YbHg2 and YbHg3 could be prepared mostly for the first time and their structures have been determined. Both binary Hg-systems of Tb and Yb are similar, although the Tb-Mn and Yb-Mn systems differ considerably. (Author)
AD-658 216 HC$3.00 MF$0.65

PREPARATION OF THE INTERMETALLIC COMPOUND YCo5 BY THE AMALGAM PROCESS,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
Franz Lihl. 3 Nov 66, 38p Rept no. Scientific-1
Contract AF 61 (052)-942

Descriptors: (*Magnetic materials, Intermetallic compounds), (*Intermetallic compounds, Preparation), (*Yttrium, Intermetallic compounds), (*Cobalt alloys, Preparation), Powders, Particle size, Mercury alloys, X-ray diffraction analysis, Tempering, Phase studies, Metallography, Grain structures (Metallurgy), Differential thermal analysis, Austria.
Identifiers: Yttrium alloys.

The intermetallic compound YCo5 promises to be an excellent material for high quality permanent magnets. It is, however, essential to prepare this compound in single domain particles of a grain size of the order of 10 micromillimeters. The preparation of YCo5-powders by means of the amalgam process is described in detail. The process consists of several steps, namely: (1) Preparation of Y-amalgam by solving yttrium-metal at 450C in liquid mercury; (2) preparation of Co-amalgam by electrolysis; (3) mixing of the amalgams; (4) distillation of the mercury at temperatures up to 1100C. By X-ray investigations the structure of YCo5 was confirmed and the range of homogeneity established to be very small. Metallographic and magnetic measurements proved that the amalgam process actually is a preferable means for preparing YCo5 powders. (Author)
AD-658 218 HC$3.00 MF$0.65

THERMO-DIFFUSION IN THE TUNGSTEN-BERYLLIUM SYSTEM,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
P. M. Arzhanyi, R. M. Volkova, and D. A. Prokoshkin. Jul 67, 14p
RSIC-688, TT-63-22441
Trans. of Akademiya Nauk SSSR. Otdelenie Tekhnicheskikh Nauk. Izvestiya: Metallurgiya i Toplivo, n6 p162-6 1962.

Descriptors: (*Tungsten alloys, *Beryllium alloys), USSR, Phase studies, Diffusion, Microstructure, Intermetallic compounds, Reaction kinetics.

An investigation was conducted on the surface alloying of tungsten by various elements separately and in combinations. It was found that beryllium and tungsten diffusion at 1000-1200C proceeds with a front with a simultaneous formation of a number of intermetallic phases of various thickness. The phases are separated between themselves while their boundaries correspond to steps in the concentration curve. The temperature dependences of the diffusion coefficients have been obtained for each phase. By means of X-ray and X-ray spectral analysis the structure and the phase composition of the diffusion layer have been studied. Beryllides of tungsten of the following stochiometric composition have been established: WBe24, WBe12, WBe2. The crystal structures of these phases have also been established. (Author)
AD-658 224 HC$3.00 MF$0.65

THEORY OF POINT DEFECT ANNEALING IN METALS,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
For primary bibliographic entry see Field 20B.
AD-658 291 Not available from CFSTI.

RELAXATION PHENOMENA IN METALS AND ALLOYS (SELECTED ARTICLES).
Foreign Technology Div Wright-Patterson AFB Ohio
10 May 67, 40p Rept no. FTD-MT-65-262
TT-67-62868
Edited machine trans. of mono. Relakasatsionnye Yavleniya v Metallakh i Splavakh, Moscow, 1963 p214-20, 290-3, 326-31.

Descriptors: (*Nickel alloys, Heat treatment), (*Stresses, Relaxation time), (*Iron alloys, Relaxation time), USSR, Chromium alloys, Titanium alloys, Aluminum alloys, Molybdenum alloys, Stability, Internal friction, Metals, Aging (Materials), Stainless steel, Magnetic alloys, Thermal stability, Physical properties.

Contents: Effect of thermomagnetic treatment on internal friction of Perminvar and 66-Permalloy; Investigation of regularities of stress relaxation; Relaxation stability of certain iron-nickel alloys.
AD-658 371 HC$3.00 MF$0.65

DAMPING OF DISLOCATIONS IN LEAD SINGLE CRYSTALS.
Columbia Univ New York Inst for the Study of Fatigue and Reliability
For primary bibliographic entry see Field 20K.
AD-658 412 Not available from CFSTI.

Group 11F — Metallurgy and metallography

NEUTRON IRRADIATION OF PURE METALS AND ALUMINUM-ZINC ALLOYS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ANL-7185 HC$3.00 MF$0.65

CORROSION OF ALUMINUM ALLOYS BY FLOWING HIGH-TEMPERATURE WATER,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
ANL-7227 HC$3.00 MF$0.65

METALLOGRAPHIC EVIDENCE OF STRAIN- AND IRRADIATION-INDUCED PRECIPITATION IN PRECONDITIONED HASTELLOY X-280,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 18.
BNWL-211 HC$3.00 MF$0.65

REACTIONS OF SELECTED METAL-METAL COUPLES AT 1100 DEGREES C,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
L. J. Kirby, and H. T. Fullam. Jun 67, 20p
Contract AT (45-1)-1830

Descriptors: (*Encapsulation, *Reactor fuels), (*Metals, Diffusion), Foils, Thickness, Photomicrography, Heating, Grain boundaries, Interactions.

For abstract, see NSA 21 18.
BNWL-421 HC$3.00 MF$0.65

SLIP CASTING OF RARE EARTH OXIDES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
H. T. Fullam. Jun 67, 25p
Contract AT (45-1)-1830

Descriptors: (*Slip casting, *Rare earths), Oxides, Density, Promethium, Samarium, Neodymium, Material forming, Ball mills.

For abstract, see NSA 21 18.
BNWL-437 HC$3.00 MF$0.65

HOT PRESSING OF RARE EARTH OXIDES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
H. T. Fullam, and C. J. Mitchell. Jun 67, 30p

Descriptors: (*Rare earths, Oxides), (*Hot pressing, *Promethium), (*Samarium, *Neodymium), Density, Crystal structure.

For abstract, see NSA 21 18.
BNWL-448 HC$3.00 MF$0.65

BONDING OF ALUMINUM BY THE CAPACITOR DISCHARGE MAGNETIC FORMING PROCESS,
Douglas United Nuclear, Inc., Richland, Wash.
H. G. Powers. Apr 67, 13p
Contract AT (45-1)-1857

Descriptors: (*Aluminum, *Bonding), (*Welding, Microstructure), Capacitors, Electric discharges, Magnetic fields, Leak detectors, Graphics.

For abstract, see NSA 21 17.
DUN-1941 HC$3.00 MF$0.65

SPECTROCHEMICAL DETERMINATION OF IMPURITIES IN TUNGSTEN,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
K-1683 HC$3.00 MF$0.65

FLAME SPRAYING URANIUM OXIDE,
Los Alamos Scientific Lab., N. Mex.
J. J. Rosenthal, and M. C. Tinkle. Feb 67, 7p
Contract W-7405-eng-36

Descriptors: (*Flame spraying, Uranium compounds), Oxides, Reactor fuel enrichment, Oxidation, Coatings, Graphite, Powder metals.

For abstract, see NSA 21 17.
LA-3677 HC$3.00 MF$0.65

ONE-DIMENSIONAL ELASTIC-PLASTIC CALCULATIONS FOR ALUMINUM,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20K.
For abstract, see NSA 21 17.
LA-3678 HC$3.00 MF$0.65

READING SCHEDULES FOR THE MSA PARTICLE SIZE ANALYZER,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 17.
LA-3692 HC$3.00 MF$0.65

THREADING AND ASSEMBLY OF SOFT DELTA-STABILIZED PLUTONIUM PARTS,
Los Alamos Scientific Lab., N. Mex.
R. R. Gilmore, B. N. Robbins, and J. W. Anderson. Jan 67, 5p
Contract W-7405-eng-36

Descriptors: (*Plutonium, Stabilization), (*Additives, *Gallium), (*Aluminum, *Taps), Small tools, Case hardening, Lubrication, Manufacturing methods.

For abstract, see NSA 21 17.
LA-3703 HC$3.00 MF$0.65

ANALYTICAL COORDINATION CHEMISTRY: TITRIMETRY, GRAVIMETRY, FLAME PHOTOMETRY, SPECTROMETRY, GAS EVOLUTION AND ISOTOPIC PREPARATIONS, JULY 1965 TO JUNE 1966.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7B.
NBS-TN-402 HC$0.50 MF$0.65

ANISOTROPY OF LONG RANGE ORDER IN ALLOYS.
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Reaktorwerkstoffe.
For primary bibliographic entry see Field 20B.
For abstract, see STAR 05 20.
N67-34034 HC$3.00 MF$0.65

COMBINATION OF HIGH-TEMPERATURE PLASTIC DEFORMATION AND QUENCH HARDENING.
United Kingdom Atomic Energy Authority, Harwell (England). Information Branch.
M. G. Lozinskii, V. D. Sadovskii, and E. N. Sokolkov. Sep 66, 14p AERE-TRANS-1071
Transl. Into English From Novye Protsessy Obrabotki Metal. Davleniem, Adad. Nauk Sssr, Inst. Mashinoved. (Moscow), 1962 P 85-93

Descriptors: *Austenitic steel, *Hardening, *Plastic deformation, *Quenching, *Thermomechanics, Austenite, Combination, Deformation, High temperature, Plastic, Pressure, Process, Steel, Treatment.

For abstract, see STAR 05 20.
N67-34047 HC$3.00 MF$0.65

ANALYTICAL METHOD - THE DETERMINATION OF YTTRIUM IN ALLOY STEELS.
United Kingdom Atomic Energy Authority, Harwell (England). Analytical Sciences Div.
G. S. Spicer. Jun 57, 8p AERE-AM-104

Descriptors: *Analytical chemistry, *Dilution, *Isotope, *Steel, *Yttrium, Analysis, Chemistry, Determination, Gravimetry, Procedure, Volumetric.

For abstract, see STAR 05 20.
N67-34088 HC$3.00 MF$0.65

MECHANICAL CHARACTERISTICS OF AUSTENITIC STEELS QUARTERLY REPORT, APR - JUN. 1966.
Compagnie des Ateliers Et Forges de La Loire, Paris (France). Departement des Recherches.
Jun 66, 76p QR-7, EURAEC-1783
Contract EURATOM-033-64-9-TEEF (RD)

Descriptors: *Austenitic steel, *Creep analysis, *High temperature research, *Stainless steel, Analysis, Austenite, Boiling, Chloride, Corrosion, Creep, Ferrite, High temperature, Magnesium, Mechanical, Property, Research, Solution, Stainless, Steel, Stress, Wire.

For abstract, see STAR 05 20.
N67-34140 HC$3.00 MF$0.65

THE DETERMINATION OF CADMIUM IN CADMIUM-TIN ALLOYS - AN OSCILLO-POLAROGRAPHIC METHOD.
European Atomic Energy Community, Geel (Belgium). Joint Nuclear Research Center.
H. Cuyvers, and V. Verdingh. Aug 67, 17p EUR-3494.E

Descriptors: *Analytical chemistry, *Cadmium alloy, *Polarography, *Test method, *Tin alloy, *Trace element, Activation, Alloy, Analysis, Apparatus, Cadmium, Cathode, Chemistry, Detector, Differential, Element, Flux, Measurement, Method, Neutron, Ray, Solution, Test, Tin, Trace.

For abstract, see STAR 05 20.
N67-34159 HC$3.00 MF$0.65

THE INFLUENCE OF REACTOR RADIATION ON THE AGING BEHAVIOR OF AN AL 4 PERCENT CU ALLOY.
Der Einfluss Von Reaktorbestrahlung Auf Das Auslagerungsverhalten Einer Al-4 Per Cent Cu-legierung
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Reaktorwerkstoffe.
K. D. Olshausen. Jan 67, 108p JUL-448-RW
in German

Descriptors: *Aging, *Aluminum alloy, *Crystal structure, *Radiation effect, Alloy, Aluminum, Atom, Bibliography, Copper, Crystal, Effect, Electric, Formation, Hole, Interstice, Lattice, Measurement, Phase, Quenching, Radiation, Resistance, Structure, Temperature.

For abstract, see STAR 05 20.
N67-34273 HC$3.00 MF$0.65

SPECTROPHOTOMETRIC ANALYSIS OF THIN ANTIMONY/ARSENIC ALLOY FILMS.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 20.
N67-34310 HC$3.00 MF$0.65

X-RAY INVESTIGATION OF AGING IN AN ALUMINUM 5 PERCENT MAGNESIUM ALLOY WITH SMALL SILVER ADDITIONS.
Aeronautical Research Labs., Melbourne (Australia).
J. H. Auld. Dec 66, 16p ARL/MET-62

Descriptors: *Age hardening, *Aluminum alloy, *Magnesium alloy, *Silver, *X-ray diffraction, Age, Alloy, Aluminum, Change, Diffraction, Hardening, Lattice, Magnesium, Precipitation, Structural, X-ray, Zone.

For abstract, see STAR 05 20.
N67-34458 HC$3.00 MF$0.65

MECHANISMS OF STRENGTHENING AND FRACTURE IN COMPOSITE MATERIALS PROGRESS REPORT, 1 DEC. 1966 - 1 JUN. 1967.
Stanford Univ., Calif. Dept. of Materials Science.
For primary bibliographic entry see Field 11D.
For abstract, see STAR 05 20.
N67-34533 HC$3.00 MF$0.65

GAS HYDRIDING ZIRCALOY-2 AT 400 DEG C.
Reactor Group, United Kingdom Atomic Energy Authority, Culcheth (England). Reactor Materials Lab.
M. Farrow, and J. Winton. 1967, 22p TRG-1446/C/

Descriptors: *Hydrogenation, *Zircaloy, Gas, Hydride, Hydrogen, Layer, Oxide, Permeation, Skin, Surface, Zircaloy 2.

For abstract, see STAR 05 20.
N67-34560 HC$3.00 MF$0.65

STRESS CORROSION CRACKING OF TITANIUM ALLOYS AT AMBIENT TEMPERATURE IN AQUEOUS SOLUTIONS QUARTERLY PROGRESS REPORT, 1 JAN. - 31 MAR. 1967.
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
C. B. Gilpin, and T. L. Mackay. Mar 67, 37p NASA-CR-87432, SM-49105-Q3
Contract NAS7-488

Descriptors: *Crack propagation, *Stress corrosion, *Titanium alloy, Adsorption, Alloy, Alpha, Ambient, Aqueous, Autoradiography, Beta, Corrosion, Crack, Distillation, Electron, Fractography, Gas, Hydrogen, Phase, Propagation, Resistance, Salt, Solution, Stress, Temperature, Titanium, Water.

For abstract, see STAR 05 20.
N67-34658 HC$3.00 MF$0.65

INFLUENCE OF NEUTRON IRRADIATION ON THE MECHANICAL PROPERTIES AND THE CORROSION BEHAVIOR OF ZR NB3 SN1 AND ZIRCALOY-2.
Metallgesellschaft, A. G., Frankfurt Am Main (West Germany).
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-34696 HC$3.00 MF$0.65

ROLE OF CHLORIDE IN HOT SALT STRESS-CORROSION CRACKING OF TITANIUM-ALUMINUM ALLOYS.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
R. S. Ondrejcin, S. P. Rideout, and C. L. Selby. Jul 67, 16p NASA-CR-87817, DP/NASA/-1118
Contract NASA ORDER R-124, AT/07-2/-1

Descriptors: *Chloride, *Crack, *Salt, *Stress corrosion, Alloy, Aluminum, Corrosion, Electron, Hot, Hydrogen, Mass, Metal, Moisture, Spectrometer, Stress, Surface, Titanium.

For abstract, see STAR 05 20.
N67-34738 HC$3.00 MF$0.65

ACCURATE DETERMINATION OF THE IRIDIUM IN AN ALUMINUM-2.5 PERCENT IRIDIUM ALLOY.
La Determination Precise de l'Iridium Dans Un Alliage Aluminium -2,5 Percent Iridium
European Atomic Energy Community, Geel (Belgium). Central Bureau for Nuclear Measurements.
A. Brueck. 1967, 14p EUR-3468.F
in French English Summary

Descriptors: *Aluminum alloy, *Chemical analysis, *Iridium, Alloy, Aluminum, Analysis, Chemical, Coefficient, Energy, Gravimetry, Nuclear, Precipitation, Precision, Variation.

For abstract, see STAR 05 20.
N67-34797 HC$3.00 MF$0.65

EFFECTS OF LIQUID AND VAPOR CESIUM ON STRUCTURAL MATERIALS.
Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
D. H. Jansen, and R. L. Klueh. Jun 67, 34p
NASA-CR-87504, ORNL-TM-1813
NASA ORDER W-12353, NASA ORDER R-104-/01/

Descriptors: *Cesium vapor, *Metal corrosion, *Power plant, *Rankine cycle, *Structural material, *Working fluid, Alkali, Alloy, Capsule, Cesium, Compatibility, Construction, Corrosion, Effect, Fluid, Iron, Liquid, Loop, Material, Mechanical, Metal, Nickel, Plant, Potassium, Power, Property, Refractory, Space, Static, Structural, Test, Transition, Vapor, Working.

For abstract, see STAR 05 20.
N67-34838 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF MELTING PHENOMENA IN THE AXISYMMETRIC STAGNATION REGION OF THERMALLY HIGHLY-CONDUCTING MATERIALS.
National Aerospace Lab., Tokyo (Japan).
Y. Aihara. Mar 67, 10p NAL-TR-130T

Descriptors: *Copper, *Iron, *Melting, Ablation, Axisymmetry, Conduction, Heat, High temperature, Material, Property, Region, Shield, Stagnation, Stagnation region, Thermal.

For abstract, see STAR 05 20.
N67-34877 HC$3.00 MF$0.65

HIGH RESOLUTION AUTORADIOGRAPHY.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 20.
N67-34901 HC$3.00 MF$0.65

MEASUREMENT OF THE COEFFICIENT OF THERMAL CONDUCTIVITY OF FELT-LIKE INSULATING MATERIAL.
Messung Der Waermelfitzahl Filzartiger Isolierstoffe
Deutsche Forschungsanstalt Fur Luft- Und Raumfahrt, Brunswick (West Germany). Inst. Fuer Flugzeugbau.
C. B. Stieglitz. Mar 67, 27p DLR-FB-67-29
in German, English Summary

Descriptors: *Carbon, *Impregnated material, *Thermal insulation, Conductivity, Distribution, Felt, Heat, Impregnation, Insulation, Material, Measurement, Spacecraft, Temperature, Thermal, Transfer.

For abstract, see STAR 05 20.
N67-35065 HC$3.00 MF$0.65

SOLID PHASE ADHESION OF TUNGSTEN AND SILVER.
Syracuse Univ., N. Y.
W. M. Saunders. Aug 67, 49p NASA-CR-87474
Grant NSG-483

Descriptors: *Metal-metal bonding, *Silver, *Tungsten, Adhesion, Bonding, Junction, Load, Metal, Phase, Pressure, Solid, Strength, Surface, Tensile.

For abstract, see STAR 05 20.
N67-35066 HC$3.00 MF$0.65

FATIGUE OF METALS - WHERE IT STANDS TODAY.
Aeronautical Research Labs., Melbourne (Australia).
J. Y. Mann. Mar 66, 42p ARL/SM-305
Presented At the Metal Treatment Div., Australian Inst. of Metals, Melbourne, 4 Nov. 1965

Descriptors: *Fatigue test, *Metal fatigue, *Test equipment, Air, Concept, Corrosion, Design, Engineering, Equipment, Fatigue, Joint, Loading, Metal, Metallurgy, Research, Survey, Test, Welding.

For abstract, see STAR 05 20.
N67-35135 HC$3.00 MF$0.65

APPARATUS FOR DETERMINING GASES IN METALS BY VACUUM FUSION.
Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 20.
N67-35156 HC$3.00 MF$0.65

THE EFFECT OF NEUTRON IRRADIATION ON THE HIGH TEMPERATURE TENSILE PROPERTIES OF SOME NICKEL-CONTAINING ALLOYS.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
V. B. Lawson. Mar 67, 82p AECL-2677

Descriptors: *Mechanical property, *Neutron bombardment, *Nickel alloy, *Tensile strength, Alloy, Bombardment, Chromium, Copper, Ductility, High temperature, Iron, Irradiation, Mechanical, Metallography, Neutron, Nickel, Property, Stainless, Steel, Strength, Tensile.

For abstract, see STAR 05 20.
N67-35256 HC$3.00 MF$0.65

SURFACE TREATMENT OF ZIRCONIUM ALLOYS BY OXIDIZING FUSED SALTS.
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-35272 HC$3.00 MF$0.65

A BIBLIOGRAPHY ON TRACER DIFFUSION IN METALS. SUPPLEMENT II. PART I. SELF-DIFFUSION IN PURE METALS. PART II. IMPURITY DIFFUSION IN PURE METALS. PART III. SELF AND IMPURITY DIFFUSION IN ALLOYS,
Oak Ridge National Lab., Tenn.
John Askill. Jun 67, 11p
Contract W-7405-eng-26

Descriptors: (*Metals, Diffusion), (*Tracer studies, Bibliographies), (*Alloys, *Impurities), Heat of activation, Autoradiography.

For abstract, see NSA 21 17.
ORNL-3795-Suppl-2 HC$3.00 MF$0.65

FABRICATION OF REBUILT BONUS REACTOR SUPERHEATER FUEL ASSEMBLY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18J.

For abstract, see NSA 21 17.
ORNL-4072 HC$3.00 MF$0.65

IRRADIATION BEHAVIOR OF EU203-STAINLESS STEEL DISPERSIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
ORNL-4104 HC$3.00 MF$0.65

THERMAL CONDUCTIVITY MEASUREMENTS ON SOLIDS BETWEEN 20 AND 150 DEGREES C USING A COMPARATIVE-LONGITUDINAL APPARATUS RESULTS ON MgO, BeO, ThO2, TH/SUB X/U/SUB 1-X/O/SUB 2-Y/ AND ALUO2 CERMETS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
ORNL-4121 HC$3.00 MF$0.65

MSRE CONTROL ELEMENTS MANUFACTURE, INSPECTION, DRAWINGS, AND SPECIFICATIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
ORNL-4123 HC$3.00 MF$0.65

NEAR-SURFACE DIFFUSION ANOMALY IN GOLD,
Oak Ridge National Lab., Tenn.
A. J. Mortlock. Jul 67, 16p
Contract W-7405-eng-26

Descriptors: (*Gold, Diffusion), (*Cobalt, *Nickel), Tracer studies, Annealing, Penetration.

For abstract, see NSA 21 17.
ORNL-4141 HC$3.00 MF$0.65

AUTOMATIC PROCESSING OF METALLURGICAL ABSTRACTS FOR THE PURPOSE OF INFORMATION RETRIEVAL.
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
For primary bibliographic entry see Field 5B.
PB-175 807 HC$3.00 MF$0.65

A PHENOMENOLOGICAL THEORY FOR THE TRANSIENT CREEP OF METALS AT ELEVATED TEMPERATURES.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 20K.
PB-175 917 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 14B.
PB-176 006 HC$3.00 MF$0.65

TECHNIQUES FOR THINNING PLUTONIUM FOR TRANSMISSION ELECTRON MICROSCOPY,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
RFP-899 HC$3.00 MF$0.65

TENSILE PROPERTIES OF GAMMA QUENCHED AND AGED URANIUM-RICH NIOBIUM ALLOYS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Ross J. Jackson, Ronald P. Brugger, and Delmar V. Miley. 2 Jun 67, 15p
Contract AT (29-1)-1106

Descriptors: (*Niobium alloys, Heat treatment), (*Uranium alloys, Mechanical properties), Tensile properties, Quenching (Cooling), Aging (Materials), Corrosion resistance.

For abstract, see NSA 21 17.
RFP-933 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

11G. Miscellaneous Materials

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART II.
Annual summary rept., 19 Apr 63-18 Jun 64,
Monsanto Research Corp., Dayton, Ohio.
J. M. Butler, and J. A. Ellard. Jun 64, 49p
USA-NLABS-TPMR-64-6-Pt-2
Contract DA-19-129-QM-1773

Descriptors: (*Thermal radiation, Nuclear explosions), (*Thermal insulation, Polymers), (*Polymers, Thermal insulation), Polyethylene plastics, Styrene plastics, Nylon, Vinyl plastics, Fluorine compounds, Halocarbon plastics, Polyvinyl chloride, Acrylonitrile polymers, Acrylic resins, Expanded plastics, Isocyanate plastics, Pyrolysis, Chlorine compounds, Simulation, Smokes, Attenuation, Test equipment, Test facilities, Chromium compounds, Oxides, Impregnation, Tables, Iodine, Plastic coatings, Films, Protective treatments.
Identifiers: Polyvinyl fluoride, Chromic oxide.

A high-intensity light source for simulation of the thermal pulse from nuclear explosions was constructed, calibrated and used for testing of 12 polymer systems at 19.2 cal/sq cm/sec. The following polymers, filled with 5% Cr2O3, were tested: Polyethylene, polystyrene, 6.6-nylon; polyvinyl fluoride, polyvinyl fluoride, polyacrylonitrile, polyvinyl chloride, polytetrafluoroethylene, chlorinated polyvinyl chloride, polymethyl methacrylate, polyvinylidene fluoride, and a polyurethane foam. In addition, two coded samples from U. S. Army Natick Laboratory (NLAB) were tested. Polystyrene, polyvinyl chloride, polyurethane foam, and the NLAB samples gave the most rapid production of smoke, light attenuation being detected in less than 0.2 sec. These materials also gave the greatest reduction (>60%) in transmission over a total four-second exposure. Consistent with these results with the hot filament pyrolysis technique, polymethyl methacrylate and polytetrafluoroethylene gave considerably less smoke on exposure to the high intensity light source. (Author)
AD-460 379 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION.
Technical rept. no. 4, 1 Jul-31 Oct 64,
Monsanto Research Corp., Everett, Mass. Boston Lab.
A. W. Berger, and J. A. Pirog. Oct 64, 14p MRB-4011Q4
Contract DA-19-129-QM-1773 (X)

Descriptors: (*Aromatic compounds, Photochemistry), (*Hydrazine derivatives, Photochemistry), (*Photochromism, Aromatic compounds), Optical materials, Organic compounds, Polycyclic compounds, Photosensitivity, Absorption spectrum, Recombination reactions, Reaction kinetics, Photolysis, Nuclear explosions, Electromagnetic waves, Spectra (Visible + Ultraviolet), Free radicals, Electron transitions.
Identifiers: Tetrakis (Octyl phenyl)Hydrazine.

The photodissociation study of a purified tetrakis (p-octylphenyl) hydrazine (TPOPH) in benzene (0.0001M) has shown that the recombination rate constant is independent of wavelength in the region of the two major absorption peaks. The recombination follows second-order kinetics for at least 2.5 half-lives. The average initial half-life is 35.4 = 2.4 msec, excluding the low absorption region at 500-600 millimicrons. At 560 millimicrons the decay is first order. It is not clear whether this reaction is associated with TPOPH or with impurity. (Author)
AD-463 014 HC$3.00

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART I.
Annual summary rept. 19 Apr 63-18 Jun 64,
Monsanto Research Corp., Everett, Mass.
A. W. Berger, and R. H. Jackson. Jun 64, 54p
MRB-4011A1
USA-NLABS-TPMR-64-6-Pt-1
Contract DA-19-129-QM-1773

Descriptors: (*Organic compounds, Thermal radiation), (*Hydrazine derivatives, Photochemistry), (*Photochromism, Aromatic compounds), Spectra (Visible + ultraviolet), Colors, Absorption spectrum, Temperature, Test equipment, Photolysis.

Flash photolysis studies were undertaken on organic hydrazines as part of a program to develop materials capable of providing protection from long wavelength electromagnetic radiations from nuclear explosions.
AD-463 041 HC$3.00

PROCESSING VARIABLES AND THEIR EFFECT ON THE FINAL PROPERTIES OF POLYETHYLENE CABLE JACKETS,
Du Pont de Nemours (E. I.) and Co., Wilmington. Del. Plastics Dept.
For primary bibliographic entry see Field 9A.
AD-479 562 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN ETHYLENE-PROPYLENE POLYMERS FOR WIRE AND CABLE APPLICATIONS,
Enjay Labs., Linden, N. J.
For primary bibliographic entry see Field 11I.
AD-479 563 HC$3.00 MF$0.65

POLYSULFONE FOR WIRE AND CABLE,
Union Carbide Corp., New York. Plastics Div.
For primary bibliographic entry see Field 9A.
AD-479 565 HC$3.00 MF$0.65

'KAPTON' POLYIMIDE FILM: A THIN WALL HIGH-TEMPERATURE INSULATION FOR WIRE AND CABLE,
Du Pont de Nemours (E. I.) and Co., Wilmington. Del. Film Dept.
For primary bibliographic entry see Field 9A.
AD-479 578 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF CATHODOLUMINESCENT PHOSPHOR WITH HIGH-INTENSITY ULTRAVIOLET EMISSION.
National Cash Register Co Dayton Ohio Research Div
For primary bibliographic entry see Field 9A.
AD-657 589 HC$3.00 MF$0.65

SURFACE POTENTIALS OF ADSORBED ORGANIC MONOLAYERS ON METALS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 7D.
AD-658 058 HC$3.00 MF$0.65

IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS.
Monsanto Research Corp Dayton Ohio Dayton Lab
For primary bibliographic entry see Field 6K.
AD-658 203 HC$3.00 MF$0.65

FULL-SCALE FIRE MODELING TEST STUDIES OF 'LIGHT WATER' AND PROTEIN TYPE FOAMS,
Naval Research Lab Washington D C
For primary bibliographic entry see Field 13L.
AD-658 318 HC$3.00 MF$0.65

CARBIDE-GRAPHITE COMPOSITES. SECOND PROGRESS REPORT,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 11D.
For abstract, see NSA 21 17.
LA-3652 HC$3.00 MF$0.65

A STUDY OF COHESION, FRICTIONAL RESISTANCE, AND INTERLOCKING OF PARTICLES AS BASIC STRENGTH COMPONENTS OF ASPHALTIC CONCRETE.
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 11B.
PB-175 761 HC$3.00 MF$0.65

ASPHALT CONCRETE COMPACTION STUDIES USING NUCLEAR DEVICES,
California State Div. of Highways.
For primary bibliographic entry see Field 13B.
PB-175 932 HC$3.00 MF$0.65

STRIPPING IN HOT - MIXED SAND ASPHALT MIXTURES.
Ohio State Univ., Columbus. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-175 954 HC$3.00 MF$0.65

11H. Oils, Lubricants, and Hydraulic Fluids

AN EXPERIMENTAL APPARATUS FOR THE MEASUREMENT OF SESSILE DROP CONTACT ANGLES AT ELEVATED TEMPERATURES.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 14B.
AD-658 023 HC$3.00 MF$0.65

EFFECT OF SEVERAL GAS ATMOSPHERES ON HYDRAULIC FLUID SHEAR STABILITY.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
Robert L. LeMar. Aug 67, 21p
RIA-67-1954

Descriptors: (*Hydraulic fluids, Stability), Polyethylene plastics, Acrylic resins, Oils, Oscillation, Shear stresses, Nitrogen, Hydrogen, Helium, Viscosity, Solubility, Test methods.

The sonic-shear stability of polyisobutylene and polymethacrylate solutions in oil was examined under several gases and at pressures up to five atmospheres. Tests were conducted in a pressurized sonic treatment cup under nitrogen, hydrogen and helium atmospheres. Comparison tests under air were made at one atmosphere. Results indicated that sonic-shear stability varied inversely with gas solubility for all the gases, except air at one atmosphere. Both polymer solutions displayed highest viscosity losses under the helium atmosphere. The use of gases other than air and sonic test cell pressurization showed promise as a modification of the sonic-shear method, to make it more closely reflect mechanical-shear tests. (Author)
AD-658 057 HC$3.00 MF$0.65

SURFACE POTENTIALS OF ADSORBED ORGANIC MONOLAYERS ON METALS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 7D.
AD-658 058 HC$3.00 MF$0.65

A REVIEW AND PROPOSED AMENDMENT OF MIL-H-5606B,
Naval Air Development Center Johnsville Pa Materials Application and Engineering Div
W. E. MacKenzie. 23 Aug 67, 8p Rept no. NADC-MA-6709

Descriptors: (*Hydraulic fluids, *Specifications), Test methods, Sampling, Organic solvents, Military requirements.

An investigation was conducted to review the properties specified in MIL-H-5606B which concerns the evaluation of hydraulic fluids, and to clarify and update the requirements and test methods.
AD-658 313 HC$3.00 MF$0.65

11I. Plastics

INVESTIGATION OF ORGANIC COMPOUNDS FOR THERMAL PROTECTION. PART II.
Monsanto Research Corp., Dayton, Ohio.
For primary bibliographic entry see Field 11G.
AD-460 379 HC$3.00

CHLORINATED POLYETHYLENE IN WIRE AND CABLE APPLICATIONS,
Allied Chemical Corp., Morristown, N. J. Plastics Div.
F. C. Csaszar, J. A. Shannon, G. N. Carmichael, and H. D. Cummings. Dec 65, 21p
The Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 1-3 Dec 65.

Descriptors: (*Polyethylene plastics, Electric cables), (*Chlorination, Polyethylene plastics), (*Polyvinyl chloride, Additives), Electric wire, Fire resistant coatings, Elastomers, Deflection, Electric insulation, Mechanical properties, Heat-resistant plastics, Vulcanizates, Amines, Peroxides, Specifications, Aging (Materials), Polymers, Fire resistant materials.

Two commercially available members of the chlorinated polyethylene family are discussed. The high initial mechanical properties, and the excellent aging characteristics of CPE 500 warrant its consideration as a new synthetic elastomer for heavy-duty jacketing for a wide variety of constructions. In addition to its superior performance, the latitude of formulation inherent in CPE 500 provides attractive economics. The ability of the polymer modifier, CPE 102, to impart flame retardance and improve flexibility while maintaining other important performance characteristics has caused its use in developing a new thermoset primary insulation system. When combined with conventional polyethylene in a vulcanizable blend, the modifier contributes its desirable features to the excellent mechanical strength, heat and abrasion resistance factors of cross-linkable polyethylene electrical insulations. As a result, the wire and cable industry now has available new technology to solve many current application problems. (Author)
AD-479 559 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN ETHYLENE-PROPYLENE POLYMERS FOR WIRE AND CABLE APPLICATIONS,
Enjay Labs., Linden, N. J.
W. C. Smith, and N. F. Newman. Dec 65, 40p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J. 1-3 Dec 65.

Descriptors: (*Polyethylene plastics, Plastic coatings), (*Plastic coatings, Cables (Mechanical)), (*Wire, Plastic coatings), (*Electric cables, Electric insulation), Electric wire, Copolymerization, Processing, Hardness, Tensile properties, Dielectric properties, Temperature, Mixtures, Water, Stability, Aging (Materials), Extrusion, Peroxides, Cumenes, Compressive properties, Triazines, Alkenes, Vinyl plastics, Clay, Naphthalenes, Ethers.

In the course of factory trials and laboratory research programs a number of important observations have been made which could influence the processibility and performance of EPM applications. The purpose of this paper is to bring these to your attention for consideration. In addition, this paper will introduce new technology which has been developed for ethylene-propylene terpolymers (designated EPDM by ASTM) especially for low voltage and jacketing applications. These are a low Mooney type of excellent processing suitable for mineral filled insulations and a high Mooney type best suited for jacketing applications. (Author)
AD-479 563 HC$3.00 MF$0.65

POLYSULFONE FOR WIRE AND CABLE,
Union Carbide Corp., New York. Plastics Div.
For primary bibliographic entry see Field 9A.
AD-479 565 HC$3.00 MF$0.65

THE RELATIONSHIP BETWEEN MOLECULAR STRUCTURE, MORPHOLOGY, AND THE MECHANICAL PROPERTIES OF MATERIALS.
Technical rept.
Mellon Inst., Pittsburgh, Pa.
28 Feb 66, 156p TR-15
Contract Nonr-2693 (00)
See also AD-626 154.

Descriptors: (*Polymers, Mechanical properties), (*Polycyclic compounds, Crystallization), (*Styrene plastics, Viscoelasticity), (*Siloxanes, Crystallization), Molecular structure, Naphthalenes, Benzenes, Crystal growth, Viscosity, Phase studies, Transition temperature, Creep, Rheology, Silicone plastics.
Identifiers: Poly (tetramethyl silphenylene) siloxane, Trinaphthyl benzene.

Crystallization rate and viscoelasticity studies were made on 1:3:5 tri-alpha-naphthyl benzene over a wide temperature range through the glass temperature. The retardation spectrum extends over nine logarithm decades of time. In applying the free volume theory to the results, it is necessary to assume that the occupied volume is independent of temperature. The temperature dependence of the transport factor in the crystal growth rate differs from that of the viscosity. Viscoelastic studies on polystyrenes of various molecular weights show that the temperature dependence of the primary softening transition differs from that of the part of the recoverable compliance near the rubbery plateau, that there is an unexpected dependence on molecular weight near the glassy level of compliance, that the steady state compliance appears to be insensitive to molecular weight, and that the zero shear viscosity depends on the 3.4 power of the molecular weight. Crystallization studies of high molecular weight poly- (tetramethyl-p-sil-phenylene)-siloxanes show that the surface energy corresponding to the crystallite ends increases with molecular weight. The molecular weight dependence of the growth rate can be explained in terms of free volume concepts. (Author)
AD-487 484 HC$3.00 MF$0.65

THE HEATS OF COMBUSTION OF POLYTETRAFLUOROETHYLENE (TEFLON) AND GRAPHITE IN ELEMENTAL FLUORINE,

National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 733 Not available from CFSTI.

CYANOACRYLATE ADHESIVE AND HEMOSTASIS,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-657 830 Not available from CFSTI.

EPOXY RESIN DENTAL MATERIALS.
Epoxylite Corp., South El Monte, Calif.
For primary bibliographic entry see Field 6E.
PB-175 781 HC$3.00 MF$0.65

11J. Rubbers

SCREENING AND EVALUATION OF LOW TEMPERATURE FUEL RESISTANT ELASTOMERS.
Interim rept. 24 Nov 65-24 May 66,
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
F. W. Bickel, and M. W. Stotz. May 66, 51p
DAC-59223
Contract DA-44-009-AMC-1061 (T)

Descriptors: (*Elastomers, Selection), Stability, Low-temperature research, Acrylonitrile polymers, Synthetic rubber, Halocarbon plastics, Silicone plastics, Isocyanate plastics, Epoxy plastics, Nitrile rubber, Chloroprenes.
Identifiers: Polysulfides, Fuel-resistant materials, Low-temperature elastomers.

Interim results of the following phases of the program are reported: (1) screening and evaluation of various elastomers to determine resistance to aromatic fuels and serviceability at temperatures to -65F; (2) evaluation of a compound developed by ERDL to determine conformance with requirements of MIL-G-1086C; (3) evaluation of resistance of low, medium and high acrylonitrile rubbers to fuels containing increasing amounts of aromatic hydrocarbons. (Author)
AD-485 679 HC$3.00 MF$0.65

POLYMERIZATION STUDIES LEADING TO HIGH STRENGTH CHEMICAL RESISTANT ELASTOMERS SERVICEABLE AT TEMPERATURE EXTREMES.
Technical rept.,
Uniroyal Inc Wayne N J Research Center
D. I. Relyea, H. P. Smith, and A. N. Johnson. Jun 67, 37p
USA-NLABS-TR-68-12-CM
Contract DA-19-129-AMC-487 (N)
See also AD-648 860.

Descriptors: (*Heat-resistant materials, Elastomers), (*Elastomers, Preparation), (*Halocarbon plastics, Polymerization), (*Polymerization, *Catalysts), Fluorine compounds, Dienes, Butadienes, Rhodium compounds, Copolymerization, Spectra (Infrared), Nuclear magnetic resonance, Organic sulfur compounds.

Rhodium compounds were found to give good conversions of fluorinated dienes to polymers in aqueous emulsion systems. For example, a 51:49 copolymer (Tg -48 deg.) of 1,1,2-trifluorobutadiene and butadiene was prepared in this way in 59% conversion in 17 hours at 50C. Several of the copolymers are formed with monomer ratios approaching the feed ratios. Microstructure of these polymers has been examined in a preliminary way by means of infrared and n. m. r. measurements. Other catalyst and fluorinated-monomer combinations were screened for activity in homopolymerization and copolymerization. A number of fluorinated sulfenyl chloride-modified cis-polybutadienes and one rhodium initiated copolymer were prepared on a scale large enough for preliminary evaluation at the U. S. Army Natick Laboratories. (Author)
AD-657 675 HC$3.00 MF$0.65

ANIONIC POLYMERIZATION OF ISOPRENE. ION AND ION-PAIR CONTRIBUTIONS TO POLYMERIZATION IN TETRAHYDROFURAN,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-657 698 Not available from CFSTI.

LOW-TEMPERATURE TRACTION RUBBER SOLE COMPOUND FOR DMS COMBAT FOOTWEAR.
Technical rept.,
Army Natick Labs Mass Clothing and Organic Materials Div
Vincent S. Javier. Mar 67, 49p Rept no. C/OM-34
USA-NLABS-TR-67-72-CM

Descriptors: (*Shoes, Materials), (*Synthetic rubber, Shoes), Styrene plastics, Butadienes, Vulcanizates, Physical properties, Wear resistance, Material forming, Military requirements.
Identifiers: Footwear soles, Low-temperature elastomers.

A new direct molded sole rubber compound designed primarily to give better traction at low temperature, and on snow and ice, than the present standard vinyl-modified Buna N rubber compound was successfully developed by utilizing Styrene-Butadiene rubber (SBR), type 1502. The vulcanizates of this new compound exhibited good physical properties which are comparable with the physical properties exhibited by the present standard sole compound. In addition, this new compound also displayed excellent ozone resistance and good low-temperature behavior - a property which makes this compound more suitable for wear on snow and ice. Furthermore, the test results on the finished boot samples showed that the new SBR compound has satisfied not only the curing conditions imposed by the CEMA and Wellco process but also the physical requirements, except for solvent resistance, which are specified in Military Specification, MIL-B-43154, for the standard direct molded sole (DMS) combat boot. (Author)
AD-658 060 HC$3.00 MF$0.65

THE PREDICTION OF SHELF-STORAGE LIFE IN RUBBERS FROM ACCELERATED HEAT AGEING TESTS. PART I. ACCELERATED OVEN AGEING.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
D. K. Thomas, R. Sinnott, and J. Day. May 67, 20p Rept no. RAE-TR-67118-Pt-1

Descriptors: (*Synthetic rubber, Life expectancy), Great Britain, Storage, Nitrile rubber, Butyl rubber, Heating, Aging (Materials), Accelerated testing, Predictions.

Oven ageing experiments in which the mechanical tests are performed at the temperature of ageing have been carried out on Nitrile, Neoprene, and Hypalon rubbers. In all cases the variation of one or more of the mechanical properties with time at a series of temperatures allows predictions to be made of shelf-storage life at ambient temperature. Comparisons drawn between these predictions and the results of actual shelf-storage tests are encouraging. (Author)
AD-658 308 HC$3.00 MF$0.65

RELAXATION PROPERTIES OF POLYESTER BASED ON POLYURETHANE UNDER SMALL DEFORMATIONS SUPERPOSED ON LARGE DEFORMATIONS,
Polytechnic Inst of Brooklyn N Y
For primary bibliographic entry see Field 20K.
AD-658 328 HC$3.00 MF$0.65

A COMPARATIVE STUDY OF ELASTOMERIC MATERIALS FOR BRIDGE BEARING PADS,
Oklahoma Univ. Research Inst., Norman.
For primary bibliographic entry see Field 13M.
PB-175 755 HC$3.00 MF$0.65

11L. Wood and Paper Products

MAGNESIUM BISULFITE PULPING AND PAPERMAKING WITH SOUTHERN PINE.
Research paper,
Forest Products Lab Madison Wis
E. L. Keller, and D. J. Fahey. Aug 67, 15p Rept no. FPL-78
Prepared in cooperation with Mississippi State Univ., State College.

Descriptors: (*Wood pulp, Paper industry), Magnesium compounds, Sulfites, Trees, Bleaching agents, Physical properties, Sulfoxides, Wood, Printing, Tables.

Describes magnesium bisulfite pulping and papermaking with southern pine in which two-ply linerboard, various printing and writing papers, toweling, and tissue paper of good quality were produced. (Author)
AD-657 817 HC$3.00 MF$0.65

AN ANALOG COMPUTER FOR PREDICTING SURFACE TEMPERATURES OF WOOD.
Research note,
Forest Products Lab Madison Wis
E. M. Wengert. Aug 67, 24p Rept no. FPL-0170

Descriptors: (*Wood, *Surface temperatures), (*Analog computers, Surface temperatures), Environmental tests, Laboratories, Energy, Design, Forestry, Tables.

Describes an analog computer that can predict surface temperatures of wood and wood products under any given environmental conditions. (Author)
AD-657 819 HC$3.00 MF$0.65

STANDARD REFERENCE MATERIALS: RECOMMENDED METHOD OF USE OF STANDARD LIGHT-SENSITIVE PAPER FOR CALIBRATING CARBON ARCS USED IN TESTING TEXTILES FOR COLORFASTNESS TO LIGHT,
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
Elio Passaglia, and Paul J. Shouse. 21 Jul 67, 22p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $0.20.

Descriptors: (*Carbon arc lamps, Calibration), (*Paper, Standards), Textiles, Test methods, Attenuation, Photosensitivity, Colors, Light, Aging (Materials).

The use of NBS Light-Sensitive Paper and NBS Booklets of Standard Faded Strips in the standardization of fading lamps is described. These lamps are used to determine the fading characteristics of textiles, and the light-sensitive paper is thus useful in standardizing this procedure. (Author)
NBS-MISC-PUB-260-15 HC$0.20 MF$0.65

DETERMINATION OF TEMPERATURE DISTRIBUTION IN WOOD WITH VARIABLE SURFACE TEMPERATURE BY NUMERICAL INGEGRATION OF DUHAMEL'S INTEGRAL.
Research note,
Forest Products Lab., Madison, Wis.

Fred Rattner, and E. L. Schaffer. Jul 67, 15p
FPL-0169

Descriptors: (*Wood, Fires), (*Forestry, *Fires), Theorems, Surface properties, Integrals, Partial differental equations, Computer programs, Temperature, Thermal diffusion.

A numerical method is developed to determine the temperature distribution in homogeneous semi-infinite or thick-walled solids when the temperature of one surface varies with time. A computer program is given in 'FORTRAN' language for the determination of the temperature distribution in the solid and illustratively applied to wood that is subjected to standard fire conditions (ASTM E-119) at the surface. The results are presented graphically. It appears that the method developed can be applied with confidence to surface time-temperature functions of other materials. (Author)
PB-175 669 HC$3.00 MF$0.65

APPALACHIAN HARDWOODS FOR PALLETS-A LABORATORY EVALUATION.
Research paper,
Forest Products Lab., Madison, Wis.
R. S. Kurtenacker, T. B. Heebink, and D. E. Dunmire. Jul 67, 23p FPL-76

Descriptors: (*Wood, *Pallets), Design, Laboratories, Manufacturing methods, Thickness, Forestry, Tables.

A laboratory evaluation of the performance characteristics of pallets fabricated from three Appalachian hardwoods. Details of the various pallet designs evaluated for each wood species are presented, together with an analysis and comparison of their performance and a description of the laboratory test procedures. Results indicate that serviceable pallets of both the reusable or expendable types may be fabricated from any of the three most prevalent Appalachian hardwood species--yellow-poplar, oak, and hickory, although species and design tend to influence performance. (Author)
PB-175 670 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR CALCULATING VENEER RECOVERY VOLUME AND VALUE,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
Richard O. Woodfin, Jr., and Mary Anne Mei. Jul 67, 44p

Descriptors: (*Plywood, *Computer programs), Volume, Costs, Time, Accuracy, Industries, Trees, Measurement, Thickness, Quality control.

When a veneer recovery study is completed and veneer recovery volumes are tabulated, the researcher is presented with the time consuming and often tedious task of compiling the data into usable tables and figures. This computer program will accomplish this in less time and with greater accuracy than hand calculations. Veneer recovery studies are being made by the Pacific Northwest Forest and Range Experiment Station's Timber Quality Research Project to Develop Better Log and Tree Grades and Current Recovery Values. Mill study techniques have been developed for obtaining accurate grade recovery information by individual peeler blocks and under mill production conditions. Computer programs have, likewise, been developed to calculate veneer recovery values and volumes. The manuscript is one of several that are available for use on recovery studies. (Author)
PB-175 718 HC$3.00 MF$0.65

TIMBER RESOURCES AND INDUSTRIES IN THE ROCKY MOUNTAIN STATES.
Intermountain Forest and Range Experiment Station, Ogden, Utah.
For primary bibliographic entry see Field 2F.
PB-175 791 HC$3.00 MF$0.65

MARKETS FOR HAWAII HARDWOOD LUMBER IN NEW SINGLE-FAMILY HOUSES ON OAHU, HAWAII.
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
For primary bibliographic entry see Field 5C.
PB-175 955 HC$3.00 MF$0.65

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

A PAIR OF NONPARAMETRIC INDICES OF AGREEMENT AND DISAGREEMENT,
Army Medical Research Lab., Fort Knox, Ky.
James N. Cronholm. 9 Nov 63, 38p AMRL-592

Descriptors: (*Statistical distributions, Reliability), (*Probability, Sampling), Statistical analysis, Tables, Errors, Polynomials.
Identifiers: Agreement, Disagreement.

A new nonparametric index of agreement, A, and its complement, D = 1-A, an index of disagreement, based on multiple agreements and disagreements, are described. These statistics are compared with a pair of complementary indices, alpha and delta= 1-a, based on pairwise agreements and disagreements. Expressions for A and D were presented and their sampling distributions, expected values, biases, sampling variances, and limiting forms were derived.
AD-431 642 HC$3.00

COMPLETE SURFACES IN E3 WITH CONSTANT MEAN CURVATURE,
Stanford Univ Calif
Tilla Klotz, and Robert Osserman. 16 Sep 65, 9p
AROD-1323:37
Contract DA-31-124-ARO (D)-170
Prepared in cooperation with California Univ., Los Angeles under Grant NSF-GP-2567.
Availability: Published in Commentarii Mathematici Helvetici v41 n4 p313-8 1966-67.

Descriptors: (*Differential geometry, Surfaces), Geometry, Spheres, Cylindrical bodies, Complex variables, Topology, Theorems.

In this paper we discuss complete surfaces in E superscript 3 which have constant mean curvature H. Our main result states that a complete, immersed surface with H identically equal to c not equal to 0 on which the Gaussian curvature K does not change sign must be a sphere or a right circular cylinder. (Author)
AD-657 537 Not available from CFSTI.

CONVERGENCE OF NORMAL OPERATORS,
California Univ Los Angeles
Burton Rodin, and Leo Sario. 24 Sep 66, 13p
AROD-1517:109
Grant DA-ARO (D)-31-124-G742
Prepared in cooperation with Stanford Univ., Calif., Contract AF 49 (638)-1345 and California Univ., San Diego, La Jolla.
Availability: Published in Kodai Mathematical Seminar Repts. v19 n2 p165-73 Jun 1967.

Descriptors: (*Operators (Mathematics), Convergence), Inequalities, Vector spaces, Mapping (Transformations), Banach space, Complex variables, Transformations (Mathematics), Theorems.
Identifiers: Harmonic functions.

The first purpose of the present paper is to show that elementary linear operator theory can be used to give an elegant proof of the fundamental existence theorem of principal functions corresponding to given normal operators L. When L is defined by a limiting process a harmonic function may also be obtained by applying the main theorem to each approximating operator and forming a limit of resulting functions. It is important to know when these processes commute. We shall give a general criterion to this effect and show that it applies to operators L0 and L1. Earlier literature on normal operators and their applications is compiled in the Bibliography. (Author)
AD-657 542 Not available from CFSTI.

CONSTRUCTION OF EIGENFUNCTION EXPANSIONS BY THE PERTURBATION METHOD AND ITS APPLICATION TO n-DIMENSIONAL SCHRODINGER OPERATIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
S. T. Kuroda. May 67, 61p Rept no. MRC-TSR-744
Contract DA-31-124-ARO (D)-462

Descriptors: (*Functions, Perturbation theory), (*Operators (Mathematics), Quantum mechanics), Scattering, Mapping (Transformations), Hilbert space, Inequalities, Theorems.
Identifiers: Eigenfunctions, Schrodinger operator.

An operator-theoretical approach to the construction of eigenfunction expansions by the perturbation method is discussed. Eigenfunction expansions in this paper mean those associated with continuous spectra. The method is to combine a stationary approach to the scattering theory with the now well developed idea of formulating generalized eigenfunction expansions in terms of a triplet of spaces. Given an expansion associated with the unperturbed operator, two complete sets of eigenfunctions of the perturbed operator are constructed and shown to be the unique solution of the Lippmann-Schwinger equation in a modified form. As an application, spectral properties of the n-dimensional Schrodinger operator -delta + f (x) are investigated in detail.
AD-657 566 HC$3.00 MF$0.65

SUMMATION OF SERIES OF POSITIVE TERMS BY CONDENSATION TRANSFORMATIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
James W. Daniel. Apr 67, 17p Rept no. MRC-TSR-743
Contract DA-31-124-ARO (D)-462

Descriptors: (*Series, Convergence), (*Transformations (Mathematics), Series), Numerical analysis, Sequences, Algorithms, Theorems.

The condensation transformation, which maps series of positive terms into more conveniently summed alternating series, each term v sub j of which is itself an infinite series, is discussed with examples. It is shown that for a large class of extremely slowly convergent series (essentially those dominated by the 'logarithmic scale') the series defining the terms v sub j are more easily summed than the original and may in fact be transformed further if desired. Numerical examples reveal the power of the method. (Author)
AD-657 567 HC$3.00 MF$0.65

SPECTRAL ANALYSIS OF COLLECTIVELY COMPACT, STRONGLY CONVERGENT OPERATOR SEQUENCES.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
P. M. Anselone, and T. W. Palmer. Apr 67, 17p Rept no. MRC-TSR-741
Contract DA-31-124-ARO (D)-462

Descriptors: (*Operators (Mathematics), Banach space), Analytic functions, Convergence, Integral equations, Mapping (Transformations), Hilbert space, Inequalities, Theorems, Vector spaces.
Identifiers: Eigenvalues.

A set H of operators on a Banach space X is collectively compact iff (Kx: K epsilon H, Norm x = or < 1) is precompact. Operators T and T sub n, n = or > 1, such that T sub n approaches T strongly and (Tn -T) is collectively compact are investigated. The spectrum of Tn is eventually contained in any given neighborhood of the spectrum of T. If f (T) is defined by the operational calculus, then f (Tn) is eventually defined, f (Tn) approaches f (T) strongly, and (f (Tn) - f (T)) is collectively compact. If f (Tn) and f (T) are spectral projections, the corresponding structural subspaces eventually have the same dimension. Other results compare eigenvalues and generalized eigenmanifolds of Tn and T. (Author)
AD-657 568 HC$3.00 MF$0.65

COLLECTIVELY COMPACT SETS OF LINEAR OPERATORS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
P. M. Anselone, and T. W. Palmer. Apr 67, 14p Rept no. MRC-TSR-740
Contract DA-31-124-ARO (D)-462

Descriptors: (*Operators (Mathematics), Hilbert space), Vector spaces, Mapping (Transformations), Theorems.

A set of linear operators from one normed linear space to another is collectively compact iff the union of the images of the unit ball is precompact. Several criteria for sets of operators to be collectively compact are given. It is shown that a compact set of compact operators is collectively compact, but not conversely. For a set H of compact normal operators on a Hilbert space, H is collectively compact iff H is totally bounded iff H* + (K* : K epsilon H) is collectively compact. For any set H of compact operators on a Hilbert space, H is totally bounded iff H and H* are collectively compact. The proof of these assertions depends on some interesting properties of the spectral decomposition of the operators. (Author)
AD-657 569 HC$3.00 MF$0.65

ON A QUASI-LINEAR ELLIPTIC EQUATION ARISING IN THE THEORY OF NON-NEWTONIAN FLUIDS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
C. W. Cryer. May 67, 18p Rept no. MRC-TSR-734
Contract DA-31-124-ARO (D)-462

Descriptors: (*Partial differential equations, Fluid flow), (*Fluid flow, Rings), Periodic variations, Inequalities, Mapping (Transformations), Theorems.
Identifiers: Non-Newtonian fluids.

The equation (phi subscript x/ (subscript q) 2s) subscript x, + (phi subscript y/ (subscript q) 2s) subscript y = 0, where q squared = (phi subscript x) squared + (phi subscript y) squared, 0 = or < s < 1/2, occurs in the theory of non-Newtonian fluids. It is proved that there exists a unique solution for this equation for the case of flow through an annulus. (Author)
AD-657 572 HC$3.00 MF$0.65

UPON THE PADE TABLE DERIVED FROM A STIELTJES SERIES.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
P. Wynn. Jun 67, 61p Rept no. MRC-TSR-720
Contract DA-31-124-ARO (D)-462

Descriptors: (*Power series, Tables), Transformations (Mathematics), Sequences, Series, Convergence, Numerical analysis, Theorems.
Identifiers: Pade table, stieltjes series.

The paper is concerned with the Pade table constructed from a series Summation, s = 0 to s = infinity, of ((-1) to the s power (c subscript s) (z superscript s)) whose coefficients are given by c subscript s = the integral from 0 to infinity of the quantity (u to the s power) d psi (u), where psi (u) is a bounded non-decreasing function in 0 = or < u = or < infinity. It is shown that under certain conditions, when z is real and positive, the Pade quotients along both forward and backward diagonals from monotonic sequences; an optimal property of the quotients lying upon the principal diagonal is proved. Some new convergence results are derived. The Pade quotients are compared with the transformed sums produced by certain linear methods. (Author)
AD-657 573 HC$3.00 MF$0.65

ASYMPTOTIC ESTIMATES OF THE L2 n-WIDTH.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Joseph W. Jerome. Apr 67, 27p Rept no. MRC-TSR-746
Contract DA-31-124-ARO (D)-462

Descriptors: (*Functions, Approximation (Mathematics)), Transformations (Mathematics), Inequalities, Hilbert space, Boundary value problems, Operators (Mathematics), Theorems, Theses.
Identifiers: Euclidean space, Eigenvalues.

For classes of functions of m variables satisfying a quadratic inequality involving the L sub 2-norm of derivatives up to a given order k, asymptotic estimates are given for the n-widths. They involve upper and lower inequalities of the form ((c/n) to the k/m power) + 0 (n to the -k/m power) as n approaches infinity, where ce is a positive constant which can be estimated.
AD-657 574 HC$3.00 MF$0.65

HIGHLY ACCURATE DISCRETE METHODS FOR NONLINEAR PROBLEMS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Victor L. Pereyra. May 67, 123p Rept no. MRC-TSR-749
Contract DA-31-124-ARO (D)-462

Descriptors: (*Algorithms, Convergence), (*Operators (Mathematics), Banach space), (*Boundary value problems, Nonlinear systems), Mapping (Transformations), Approximation (Mathematics), Periodic variations, Iterative methods, Oscillation, Numerical analysis, Difference equations, Theorems.

We study in this work the acceleration of the convergence of discretization algorithms for the solution of nonlinear operator equations in Banach spaces. Two methods, usually used with finite difference schemes, are extended to this general case and their asymptotic properties are established. These are: the Successive Extrapolations method (Richardson's 'extrapolation to the limit', Romberg integration), and the Iterated Deferred Corrections method (Fox's difference correction). The application of these procedures to nonlinear boundary value problems in one and two dimensions is discussed in detail and a complete set of numerical examples is presented. This includes the problem of finding periodic solutions in the case of forced oscillations. (Author)
AD-657 576 HC$3.00 MF$0.65

A NOTE ON THE CONVERGENCE OF CERTAIN NON-COMMUTATIVE CONTINUED FRACTIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
P. Wynn. May 67, 17p Rept no. MRC-TSR-750
Contract DA-31-124-ARO (D)-462

Descriptors: (*Continued fractions, Convergence), (*Rings (Mathematics), Continued fractions), Sequences, Mathematics, Theorems.

It is assumed that the coefficients of a non-commutative continued fraction are members of a normed ring; the supremum norm of A is denoted by Gamma (A), the infinimum norm by lambda (A). If gamma (c sub 2) + gamma (c sub 3) + summation, s=4 to s=r, of the following: gamma (c sub 5) (1 + gamma (c sub 2)) (1 + gamma (c sub 3)).. (1 + gamma (c sub (s-2)))<1 then the convergents of both continued fractions pre (c sub 0 + (c sub 1/1+) (c sub 2/1+)...) and post (c sub 0 + (c sub 1/1+) (c sub 2/1+)...) exist, and both continued fractions converge uniformly. A further convergence result is derived.
AD-657 577 HC$3.00 MF$0.65

ON THE HOLDER CONTINUITY OF AN INTEGRAL INVOLVING BESSEL FUNCTIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
S. T. Kuroda Mar 67, 22p Rept no. MRC-TSR-745
Contract DA-31-124-ARO (D)-462

Descriptors: (*Bessel functions, *Integrals), Operators (Mathematics), Inequalities, Special functions (Mathematical), Theorems.
Identifiers: Schrodinger operator, Euclidean space.

With the aim of using in an argument in the study of the spectrum of the Schrodinger operators, a particular integral involving the Bessel functions and depending on a parameter is considered. The main purpose is to investigate the continuity property of the integral with respect to the parameter. It is shown that it is Holder continuous with the exponent large enough for the purpose of the application and that the Holder continuity is uniform with respect to the order of the Bessel function involved. The second point constitutes the major part of the discussion. (Author)
AD-657 578 HC$3.00 MF$0.65

MATRIX LINKS, AN EXTREMIZATION PROBLEM, AND THE REDUCTION OF A NON-NEGATIVE MATRIX TO ONE WITH PRESCRIBED ROW AND COLUMN SUMS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
M. V. Menon. Jun 67, 19p Rept no. MRC-TSR-651
Contract DA-31-124-ARO (D)-462

Descriptors: (*Matrix algebra, Theorems), Algorithms, Linear programming, Mathematics.

If alpha is the class of non-negative m x n matrices A of a given pattern, with a11 = 0 and with prescribed i th row sum and j th column sum, i, j>1, certain matrix operations are defined which when applied to each A a member of alpha lead to two matrices whose first row sums equal Sup (subscript A a member of alpha) (first row sum of A) and Inf (subscript A a member of alpha) (first row sum of A). This result is used in the proof of the following one. Let A* be a given non-negative matrix. Let alpha be the class of non-negative matrices of the same pattern as A* and with all its row and column sums prescribed. If alpha is not empty, there exists a unique A a member of alpha and two diagonal matrices U and V such that A* = UAV.
AD-657 579 HC$3.00 MF$0.65

APPROXIMATE SOLUTION OF INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS BY BOUNDARY VALUE TECHNIQUES.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Donald Greenspan. Jun 67, 27p Rept no. MRC-TSR-752
Contract DA-31-124-ARO (D)-462

Descriptors: (*Initial value problems, *Differential equations), (*Boundary value problems, *Numerical methods and procedures), Approximation (Mathematics), Partial differential equations, Distribution functions, Iterative methods, Periodic variations.

Initial value problems are studied numerically by means of two distinctly different types of boundary value techniques. The problems treated are those for which either asymptotic estimates or results about the periodicity of solutions are available. Nontrivial examples which contain singularities and/or nonlinearities are discussed. Also, an example is provided for which initial value techniques diverge while boundary value techniques yield accurate approximations. (Author)
AD-657 587 HC$3.00 MF$0.65

ON INCIDENCE MATRICES,
Michigan State Univ East Lansing Dept of Statistics
Peter C. C. Wang. 31 Aug 67, 14p Rept no. TR-18, RM-197
Contract Nonr-2587 (02)

Descriptors: (*Matrix algebra, Permutations), Inequalities, Optimization, Computers, Mathematics.

Given an m x n incidence matrix A (m,n), it is desired to 'squeeze' as many of its 1's as possible into its upper left-hand corner by a sequence of row and column permutations. Such problem arised in designing switches for computers. To establish criteria for the optimal matrix of matrix of the class of row and column permutations, we assign a weight W sub ij to each position in the original matrix where W sub ij is the weight assigned to the i-th row, j-th column position. The weight of matrix A (m,n) = (a sub ij) is taken to be summation, 1 = or < i = or < m, 1 = or < j = or < n, of (A sub ij W sub ij). Suppose W sub ij A (m,n) are given, then denote P (A) the permutation derived matrices of A, then the problem is to find max (A epsilon P (A)) summation, 1 = or < i = or < m, 1 = or < j = or < n, of (A sub ij W sub ij). In particular, when W matrix is square and A is the identity matrix, then this problem is reduced to the well-known assignment problem. (Author)
AD-657 611 HC$3.00 MF$0.65

WHAT IS A SATISFACTORY QUADRATIC EQUATION SOLVER.
Technical rept.,
Stanford Univ Calif Dept of Computer Science
George E. Forsythe. 7 Aug 67, 13p Rept no. CS-74
Contract Nonr-225 (37)

Descriptors: (*Equations, Programming (Computers)), Inequalities, Algorithms, Numbers, Subroutines, Numerical analysis.
Identifiers: Quadratic equations, Floating-point operation.

The report discusses precise requirements for a satisfactory computer program to solve a quadratic equation with floating-point coefficients. The principal practical problem is coping with overflow and underflow.
AD-657 639 HC$3.00 MF$0.65

ZERO-SETS IN POLYDISCS,
Wisconsin Univ Madison
Walter Rudin. 10 Feb 67, 7p
AFOSR-67-1966
Grant AF-AFOSR-1160-66
Prepared in cooperation with California Univ., San Diego.
Availability: Published in Bulletin of the American Mathematical Society v73 n4 p580-3 Jul 1967.

Descriptors: (*Functions, Theorems), Complex variables, Topology, Mapping (Transformations), Series, Mathematics.
Identifiers: Polydiscs.

The following theorem is proved: If E is the zero-set of a (possibly unbounded) holomorphic function in the open polydisc U superscript n, and if no point of the distinguished boundary T superscript n is a limit point of E, then E is actually the zero-set of some bounded holomorphic function in U superscript n. It is also shown that the word 'bounded' cannot be replaced by 'uniformly continuous' in the above conclusion. (Author)
AD-657 646 Not available from CFSTI.

SOME LIMIT THEOREMS FOR ORDINARY DIFFERENTIAL SYSTEMS,
Oklahoma Univ Norman Dept of Mathematics
William T. Reid. 30 Aug 66, 19p
AFOSR-67-1996
Grant AF-AFOSR-749-65
Availability: Published in Journal of Differential Equations v3 n3 p423-39 Jul 1967.

Descriptors: (*Differential equations, Theorems), (*Integral equations, Theorems), Matrix algebra, Inequalities, Convergence, Control.
Identifiers: Limit theorem.

The paper is devoted to limit theorems and to related results for a system of generalized differential equations of a type previously treated by the author. Prefatory to the proof of these results in Sections 3 and 4, Section 2 is devoted to the proof of a limit theorem for Riemann-Stieltjes integral equations of the form studied by H. S. Wall, MacNerney, and Hildebrandt. Certain application of these limit theorems are discussed in Section 5.
AD-657 654 Not available from CFSTI.

ON THE SEARCH FOR VARIATIONAL PRINCIPLES.
Minnesota Univ Minneapolis Dept of Chemical Engineering
For primary bibliographic entry see Field 20M.
AD-657 660 Not available from CFSTI.

A USEFUL MATRIX INVERSION FORMULA AND ITS APPLICATIONS.
Revised ed.,
Syracuse Univ N Y Dept of Electrical Engineering
H. C. Chen, and D. K. Cheng. 30 Jan 67, 5p
AROD-6886:3
Grant DA-ARO (D)-31-124-G907
Revision of manuscript submitted 30 Jan 67.
Availability: Published in Proceedings of the IEEE v55 n5 p705-6 May 1967.

Descriptors: (*Operators (Mathematics), *Matrix algebra), Transformations (Mathematics), Relativity theory, Field theory, Mathematical analysis.
Identifiers: Electrodynamics.

A theorem concerning the inversion of a linear operator which is expressible as a combination of matrices is proved. Two examples, one in electrodynamics of moving media and the other involving a scaling operator in Lorentz transformation, are given to demonstrate its applications. (Author)
AD-657 711 Not available from CFSTI.

SCATTERING FROM COULOMB-LIKE POTENTIALS WITHOUT DIVERGENCES OR CUTOFF . I. FORMALISM: GENERALIZED LIPPMANN-SCHWINGER EQUATIONS,
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 20J.
AD-657 713 Not available from CFSTI.

THE TWO CONCEPTS OF INFORMATION,
George Washington Univ Washington D C
For primary bibliographic entry see Field 9D.
AD-657 746 Not available from CFSTI.

PRIOR INFORMATION AND BIAS IN SEQUENTIAL ESTIMATION,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 9D.
AD-657 754 HC$3.00 MF$0.65

MINIMIZATION OF BOOLEAN FUNCTIONS CONTAINING ARBITRARY PARAMETERS.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9B.
AD-657 760 HC$3.00 MF$0.65

ON LINEAR FORMS AND STOCHASTIC INTEGRALS,
Catholic Univ of America Washington D C
R. G. Laha, and E. Lukacs. 1965, 14p
AFOSR-67-1969
Grants AF-AFOSR-437-63, NSF-GP-3725
Availability: Published in Proceedings of the International Statist Inst. (35th), Belgrade (Yugoslava), Sep 65 p828-40.

Descriptors: (*Stochastic processes, Theorems), (*Probability, Theorems), Random variables, Sequences, Convergence, Inequalities, Distribution functions.

The authors proved the following two theorems: Theorem 1. Let (x sub j) be a finite or denumerable sequence of independently and identically distributed random variables and let (a sub j) be a sequence of real numbers. Suppose that X sub j has a finite variance sigma squared > O and that the sum summation over j of a sub j X sub j exists. Let a not equal to O be a real number. The sum summation over j of a sub j X sub j has the same distribution as aX sub 1 if, and only if, (i) the common distribution of the random variables X sub j is normal (ii) summation over j of a sub j = a, summation over j of a sub j squared = a squared. Theorem 2. The second theorem is closely related and gives the characterization of a stochastic process by means of a property of stochastic integrals. (Author)
AD-657 763 Not available from CFSTI.

ON STATIONARY POINTS OF NONLINEAR MAXIMUM PROBLEMS IN BANACH SPACES.
Revised ed.,
Deutsche Versuchsanstalt Fuer Luft-Und Raumfahrt E V Freiburg-Im-Breisgau (West Germany)
K. Kirchgaessner, and K. Ritter. 18 Jul 66, 9p
DVL-642
Revision of manuscript submitted 29 Nov 65.
Availability: Published in J. Siam Control v4 n4 p732-9 1966.

Descriptors: (*Banach space, *Quadratic programming), (*Functional analysis, Theorems), Real numbers, Mapping (Transformations), Operators (Mathematics), Saddle point method, Convergence, Control systems, Inequalities.

In the paper various aspects of the nonlinear maximum-problem in a Banach space B are considered. A nonlinear functional F has to be maximized on a bounded or unbounded convex polyhedral region R in a Banach space. The various types of 'stationary points' are investigated and it will be shown that the character of a stationary point depends only on the local properties of the functional F in the intersection of those hyperplanes in which the point lies. The results obtained are generalizations

of theorems for the finite-dimensional case, which could be used to develop a method for the solution of the nonconcave quadratic maximum-problem.
AD-657 815 Not available from CFSTI.

SU UN PROBLEMA SINGOLARE DI CAUCHY PER L'EQUAZIONE (x+y)s=Ap+Bq+Cz+Df (A Singular Problem of Cauchy with the Equation (x+y)s=Ap+Bq+Cz+Df),
Politecnico Di Milano (Italy) Istituto Di Matematica
Antonella Furioli Martinolli. 17 Mar 66, 15p Rept no. Pub-430
Text in Italian.
Availability: Published in Rendiconti dell'Istituto Lombardo di Scienze e Lettere v100 p518-28 1966.

Descriptors: (*Cauchy problem, Equations), Transformations (Mathematics), Partial differential equations, Inequalities, Theorems, Mathematics.
AD-657 818 Not available from CFSTI.

SOLUZIONI QUASI-PERIODICHE DI EQUAZIONI FUNZIONALI LINEARI (Quasi-Periodic Solution of a Linear Functional Equation),
Politecnico Di Milano (Italy) Istituto Di Matematica
Maria Lavinia Ricci, and Carla Vaghi. 1965, 9p Rept no. Pub-414
Text in Italian.
Availability: Published in Atti del Convegno su le Equazioni alle Derivate Parziali v25 Feb 27 1965.

Descriptors: (*Equations, Periodic variations), Hilbert space, Theorems, Mathematics.
AD-657 821 Not available from CFSTI.

MODELS FOR MATHEMATICAL SYSTEMS-II.
Technical memo.,
Naval Weapons Lab Dahlgren Va
Alfred H. Morris, Jr. Aug 67, 21p Rept no. NWL-TM-K-45/67
See also AD-637 127, Systems I.

Descriptors: (*Programming (Computers), *Algebras), (*Model theory, Algebras), Mapping (Transformations), Vector spaces, Rings (Mathematics), Mathematical models.

The paper is a supplement to the paper 'Models for Mathematical Systems', by A. H. Morris, Jr., AD-637 127. The multiplication and exponentiation operations for an arbitrary associative algebra are first examined, the resulting analysis being applied in a detailed treatment of the SIMPLIFY, MULT, and MULTILINEAR rings. (Author)
AD-657 840 HC$3.00 MF$0.65

MENTAL TEST THEORY. VOLUME I. THE FOUNDATIONS OF MENTAL MEASUREMENT THEORY.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 868 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME II. THE CLASSICAL TEST THEORY MODEL. SECTION 1.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 869 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME II. THE CLASSICAL TEST THEORY MODEL. SECTION 2.
Educational Testing Service rinceton N J
For primary bibliographic entry see Field 5J.
AD-657 870 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME III. OTHER WEAK TRUE-SCORE MODELS.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 871 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME IV. VALIDITY AND TEST CONSTRUCTION THEORY. SECTION I.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 872 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME IV. VALIDITY AND TEST CONSTRUCTION THEORY. SECTION 2.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 873 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME V. SOME LATENT TRAIT MODELS AND THEIR USE IN INFERRING AN EXAMINEE'S ABILITY.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 874 Not available from CFSTI.

MENTAL TEST THEORY. VOLUME VI. STRONG TRUE-SCORE THEORY.
Educational Testing Service Princeton N J
For primary bibliographic entry see Field 5J.
AD-657 875 Not available from CFSTI.

WKB APPROXIMATION IN THREE DIMENSIONS,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
For primary bibliographic entry see Field 20J.
AD-657 883 Not available from CFSTI.

ON THE 'JUST NOTICEABLE DEPARTURE' OF DATA FROM THEORY,
Washington Univ Seattle Psychophysics Lab
For primary bibliographic entry see Field 5J.
AD-657 934 HC$3.00 MF$0.65

CONTINUOUS PIECEWISE-LINEAR CHEBYSHEV APPROXIMATION TO A HYPERBOLA,
Harry Diamond Labs Washington D C
Paul G. Hershall. Jun 67, 17p Rept no. HDL-TM-67-11

Descriptors: (*Curve fitting, Approximation (Mathematics)), Iterative methods, Computer programs, Theorems, Numerical methods and procedures, Mathematics.
Identifiers: Hyperbola, FORTRAN.

A simple method is presented that allows continuous piecewise-linear Chebyshev approximation to the hyperbola y = 1/x. A relative error criterion is used. The endpoints are assumed to be on the curve, and the n-1 intermediate points of the n-segment approximating function are found. Computer results for the case n = 10 are included. (Author)
AD-658 003 HC$3.00 MF$0.65

CONTINUED FRACTIONS AND UPPER AND LOWER BOUNDS IN THE BRILLOUIN - WIGNER PERTURBATION SCHEME,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20J.
AD-658 035 HC$3.00 MF$0.65

MATRIX CALCULATIONS AND APPLICATIONS,
Wisconsin Univ Madison Mathematics Research Center
B. Noble. 1965, 105p Rept no. MRC-Orientation Lecture-4
Contract DA-11-022-ORD-2059

Descriptors: (*Matrix algebra, Reviews), Numbers, Numerical methods and procedures, Vector spaces, Determinants, Stresses, Strain (Mechanics), Simultaneous equations, Functions.
Identifiers: Eigenvalues.

Matrix methods are an essential part of the mathematical equipment used in many areas of applied mathematics, the sciences, and engineering. The purpose of these lectures is to introduce the applied scientist to this powerful tool. Chapter I is concerned with the basic definitions and rules for manipulating matrices. The object of placing Chapter II, concerned with an engineering application, directly after Chapter I, is to emphasize that many of the applications of matrices require only the simplest properties of matrices - little more, in fact, than the definition of multiplication and the idea of the inverse matrix. The topics treated in the remaining three chapters are a small selection from a vast number of possibilities. Chapter III deals with the method of successive elimination for solving linear equations. Chapters IV and V deal with topics which are of central importance in matrix applications, namely ideas connected with the linear independence of vectors, and concepts connected with eigenvectors and eigenvalues.
AD-658 039 HC$3.00 MF$0.65

NUMERICAL INTEGRATION METHODS FOR BALLISTIC ROCKET TRAJECTORY SIMULATION PROGRAMS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 19D.
AD-658 064 HC$3.00 MF$0.65

THEORY OF LAGRANGE MULTIPLIERS FOR CONSTRAINED OPTIMIZATION PROBLEMS.
Technical paper,
Research Analysis Corp Mclean Va
James E. Falk. Jul 67, 31p Rept no. RAC-TP-262
Contract DA-44-188-ARO-1

Descriptors: (*Nonlinear programming, Optimization), (*Numerical analysis, Partial differential equations), Mathematical programming, Functions, Inequalities, Exponential functions, Theorems.

The paper treats an extension of one version of the classical Lagrange multiplier rule as applied to nonlinear programming problems. For a given problem, an auxiliary problem is defined and its properties are studied under various assumptions. In particular, when the given problem has a strictly convex objective function and concave constraints it is shown that the auxiliary problem is one of maximizing a concave differentiable function over an open set subject only to nonnegativity conditions. Some applications of this theory are presented only with the connection between the auxiliary problem and a 'dual' of the given problem. (Author)
AD-658 068 HC$3.00 MF$0.65

SECOND-ORDER CONDITIONS FOR CONSTRAINED MINIMA.
Technical paper,
Research Analysis Corp Mclean Va
Garth P. McCormick. Jun 67, 23p Rept no. RAC-TP-260
Contract DA-44-188-ARO-1

Descriptors: (*Mathematical programming, Optimization), (*Nonlinear programming, Optimiza-

tion), Inequalities, Vector spaces, Operators (Mathematics), Matrix algebra, Theorems.

This paper establishes two sets of 'second-order' conditions--one that is necessary, and the other that is sufficient that a vector chi* be a local minimum to the constrained optimization problem: minimize f (chi) subject to the constraints g sub i (chi) = or > 0, i = 1,...,m, and h sub j (chi) = 0, j=1,...,p where the problem functions are twice continuously differentiable. The necessary conditions extend the well-known results obtained with Lagrange multipliers that apply to equality-constrained optimization problems, and the Kuhn-Tucker conditions that apply to mixed inequality and equality problems when the problem functions are required only to have continuous first derivatives. The sufficient conditions extend similar conditions that have been developed only for equality-constrained problems. Examples of the applications of these sets of conditions are given. (Author)
AD-658 069 HC$3.00 MF$0.65

SIMPLIFIED SWITCHING FUNCTIONS FOR TIME-OPTIMAL CONTROL SYSTEMS,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 14B.
AD-658 073 HC$3.00 MF$0.65

HOW TO SOLVE LINEAR INEQUALITIES,
California Univ Berkeley Operations Research Center
David Gale. Jul 67, 22p Rept no. ORC-67-26
Contract Nonr-222 (83)

Descriptors: (*Inequalities, Algorithms), (*Simplex method, Inequalities), Linear programming, Matrix algebra, Sequences, Convergence, Theorems.

This paper is an attempt to solve the following constrained minimum problem: To present the most easily described algorithm for solving linear inequalities subject to the constraints, (1) The algorithm must be efficient. (2) It must be shown to terminate. The algorithm is a variant of the lexicographic simplex method which avoids using any artificial objective function. (Author)
AD-658 095 HC$3.00 MF$0.65

A METHOD OF MONITORING SAMPLED FUNCTIONS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14B.
AD-658 115 HC$3.00 MF$0.65

EXPECTED FADE-TIME FOR RAYLEIGH DISTRIBUTED RANDOM FUNCTION,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 17I.
AD-658 140 HC$3.00 MF$0.65

THE RUN TEST CRITERIA FOR RANDOM DATA STATIONARITY.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Neal Warner. Jun 67, 39p Rept no. ECOM-2840

Descriptors: (*Statistical processes, Control systems), Random variables, Sampling, Servomechanisms, Probability density functions, Invariance, Correlation techniques, Power spectra.
Identifiers: Stationarity tests.

Random operational signals recorded during control system evaluation tests or equipment vibration surveys are often reduced to power spectral curves or related quantities such as transfer functions so that the distribution of signal amplitude as a function of frequency will be evident. However, meaningful power spectral quantities are only valid for stationary data. This report discusses theoretical aspects of stationarity, and investigates the application of the most significant stationarity test, the run test, to randomly varying signals. Run test procedures and implementation are outlined and applied. (Author)
AD-658 223 HC$3.00 MF$0.65

SEPARATION OF ZEROS OF THE RIEMANN ZETA-FUNCTION,
California Univ Berkeley
R. Sherman Lehman. 11 Mar 65, 22p
AFOSR-67-2122
Grant AF-AFOSR-553-64
Availability: Published in Mathematics of Computation v20 n96 p523-41 Oct 1966.

Descriptors: (*Special functions (Mathematical), Numerical analysis), Complex variables, Errors, Series, Approximation (Mathematics), Theorems, Analytic functions, Computer programs.
Identifiers: ALGOL.

A high speed computer is used to establish that the first 250000 zeros of the Riemann zeta-function in the upper half plane all have real part equal to 1/2. The major part of the calculation was done with a program which uses the Riemann-Siegel asymptotic formula. A verbal description of the program, a detailed error analysis, and an ALGOL version of the program are given. A theorem about the function S1 (T) which occurs in the theory of distribution of zeros of the zeta-function is proved and applied. (Author)
AD-658 256 Not available from CFSTI.

A THEOREM ON RANDOM FOURIER SERIES ON NONCOMMUTATIVE GROUPS,
Massachusetts Inst of Tech Cambridge
Alessandro Figa-Talamanca, and Daniel Rider.
15 Mar 66, 9p
AFOSR-67-2119
Grant AF-AFOSR-335-63
Availability: Published in Pacific Journal of Mathematics v21 n3 p487-92 1967.

Descriptors: (*Groups (Mathematics), *Fourier analysis), Hilbert space, Mathematics, Theorems, Inequalities, Operators (Mathematics).

Let G be a compact group. For x a member of G we shall consider a formal Fourier series (*) summation (d sub i) Tr (U sub i A sub i D sub i (x) where the D sub i are distinct (non equivalent) irreducible representations of G of degree d sub i, U sub i are arbitrary unitary operators and A sub i fixed linear transformations on the Hilbert space of dimension d sub i and Tr denotes the ordinary trace. We shall prove that summation (d sub i)Tr (A sub i, A* sub i) < infinity, provided that (*) represents a function in L superscript 1 (G) for all U = (U sub i) belonging to a set M which has positive Haar measure in the group G = Phi U (d sub i), where U d sub i is the group of all unitary operators on the d sub i-dimensional space.
AD-658 260 Not available from CFSTI.

ON QUASILINEAR ELLIPTIC FUNCTIONAL-DIFFERENTIAL EQUATIONS,
Massachusetts Inst of Tech Cambridge Dept of Mathematics
Philip Hartman. 1967, 17p
AFOSR-67-2128
Contract AF 49 (638)-1382
Availability: Published in Differential Equations and Dynamic Systems p393-407 Academic Press, Inc., New York 1967.

Descriptors: (*Partial differential equations, Functional analysis), Mapping (Transformations), Boundary value problems, Inequalities, Banach space, Set theory, Theorems.

This reprint is a resume of a lecture dealing with the existence of weak, uniformly Lipschitz continuous solutions for Dirichlet boundary value problems associated with an elliptic functional-differential equation of the form (*) div a (x,u,ux) + F (u) (x) = 0. In this lecture, we expound and extend results of Hartman and Stampacchia (Acta Math. 115 (1966)271-310). The first part of the paper deals with the functional analysis basis of the work. In it, we obtain, by the method of 'monotonicity', the existence of solutions of functional inequalities defined on convex sets in Banach spaces. In the second part of the paper, we derive a priori estimates which show that the solutions of the functional inequalities are actually the desired solutions of (*).
AD-658 351 Not available from CFSTI.

ON HOMOTOPIC HARMONIC MAPS,
Johns Hopkins Univ Baltimore Md
Philip Hartman. 4 May 66, 18p
AFOSR-67-2127
Contract AF 49 (638)-1382
Availability: Published in The Canadian Journal of Mathematics v19 p673-87 1967.

Descriptors: (*Differential geometry, Theorems), Partial differential equations, Integrals, Mapping (Transformations), Initial value problems, Operators (Mathematics).
Identifiers: Euclidean space.

The paper proves a group of assertions concerning homotopic harmonic maps.
AD-658 366 Not available from CFSTI.

ON A FORM REPRESENTING A LARGE COLLECTION OF PRIMES,
Florida Univ Gainesville Dept of Mathematics
L. M. Chawla, John E. Maxfield, and R. G. Selfridge. 1 Oct 66, 5p
AFOSR-67-2153
Grants AF-AFOSR-472-65, NSF-GP-5296
Availability: Published in Journal of Natural Sciences and Mathematics v6 n2 p241-2 Oct 1966.

Descriptors: (*Prime numbers, Tables), Number theory, Mathematics.

Let p be an odd prime. The problem discussed in this note is which odd primes p can be represented by the form (1) p = the absolute value of the quantity ((x to the lth power) + or - m (x + or - 1)) where m = or < (x - 1)/2 and l are positive integers and x an odd prime. While no definitive answer has been found as to what percentage of the primes fail to be representable in this form, a table is given of those primes less than or equal to 89413 which fail to be so representable. It is found that among the first 8659 primes only 226, or a little less than three per hundred, fail to be representable by formula (1). The calculation was performed on an I.B.M. 709 high speed computer.
AD-658 368 Not available from CFSTI.

TRUNCATIONS IN THE METHOD OF INTERMEDIATE PROBLEMS FOR LOWER BOUNDS TO EIGENVALUES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Norman W. Brazley, and David W. Fox. 11 Jan 61, 24p Rept no. CF-2911
Contract NOrd-7386
Prepared in cooperation with National Bureau of Standards, Washington, D. C.

Descriptors: (*Operators (Mathematics), Hilbert space), (*Matrix algebra, Operators (Mathematics)), Inequalities, Sequences, Quantum mechanics, Vector spaces, Theorems.
Identifiers: Eigenvalues.

The paper gives two new procedures for determining lower bounds to eigenvalues of semi-bounded self-adjoint operators. These procedures, while phrased in the language of Hilbert space, result in useful computational methods for the estimation

of eigenvalues and eigenvectors of differential operators occurring in classical and quantum mechanics. Our procedures are based on the method of intermediate problems.
AD-658 377 HC$3.00 MF$0.65

ERROR BOUNDS FOR EIGENVECTORS OF SELF-ADJOINT OPERATORS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Norman W. Bazley, and David W. Fox. 8 Sep 61, 10p Rept no. CF-2940
Contract NOrd-7386
Prepared in cooperation with National Bureau of Standards, Washington, D. C.

Descriptors: (*Operators (Mathematics), Hilbert space), (*Matrix algebra, Operators (Mathematics)), Sequences, Functions, Quantum mechanics, Inequalities, Convergence.
Identifiers: Eigenvalues.

Error estimates are given for Norm (u sub i-phi), where Norm (u sub i-phi) is a normalized eigenvector of a self-adjoint operator A and phi is a normalized approximating vector. The estimates contain upper and lower bounds to certain of the eigenvalues of A together with the terms (A phi, phi) and (A phi, A phi). (Author)
AD-658 381 HC$3.00 MF$0.65

MEAN AND VARIANCE OF CORRELATION COEFFICIENT ESTIMATES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
L. M. Spetner. 16 Mar 61, 13p Rept no. CF-2923
Contract NOrd-7386

Descriptors: (*Correlation techniques, Reliability), (*Statistical processes, Reliability), Sampling, Measurement, Probability, Mathematics.

When one computes a set of correlation coefficients from experimental data, one is usually interested in having an estimate that will tell him how reliable his correlation coefficients are. In this paper the mean of the correlation coefficient estimate is computed and an expression for its bias is given. Also computed is the variance of the estimate which serves to indicate its quality.
AD-658 384 HC$3.00 MF$0.65

A PROCEDURE FOR ESTIMATING EIGENVALUES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Norman W. Bazley, and David W. Fox. 20 Nov 61, 13p Rept no. CF-2945
Contract NOrd-7386
Prepared in cooperation with National Bureau of Standards, Washington, D. C.

Descriptors: (*Operators (Mathematics), Hilbert space), (*Matrix algebra, Operators (Mathematics)), Inequalities, Sequences, Convergence, Vector spaces.
Identifiers: Eigenvalues.

A new procedure is given for calculation of lower bounds to the eigenvalues of self-adjoint operators. Computation of the lower bounds is reduced to the solution of linear algebraic problems. (Author)
AD-658 389 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
20 Apr 67, 250p Rept no. FTD-MT-64-356
TT-67-62872
Edited machine trans. of Leningrad Univ. Vestnik (USSR), v19 n1, Matematiki, Mekhaniki i Astronomii n1 p1-176 1964.

Descriptors: (*Mathematics, USSR), (*Mechanics, USSR), (*Astronomy, USSR), Differential equations, Linear systems, Probability, Game theory, Functions, Sequences, Stochastic processes, Integral equations, Orbital trajectories, Control, Optimization, Vibration, Supersonic flow, Perturbation theory, Kinetic theory, Aerodynamics, Wings, Motion, Interplanetary trajectories, Light, Scattering, Spectroscopy, Boundary value problems, Astrophysics.

Contents: On the boundedness of solutions of one system of differential equation of the third order; Convergence in dissipative systems of the second order; Solution of a discrete two-person game with bluffing; Invariants of entropy type of automorphism of Lebesgue's space; On estimation of spectral functions of one class of stationary random sequences; Limit theorems for large deviations when Cramer's condition is broken; One optimal control problem; The theory of nonliner vibrations; Evolution equations of rarefied gas; Supersonic flow about blunt bodies of rotation; The theory of unsteady motion of a wing with a small aspect ratio; Distribution function of velocities in a non-rotating steller system and energy, taken away during dissipation; Optimum coplanar flight between orbits; Multiple light scattering in a spectral line; On one class of solutions of boundary value problems for linear elliptic equations with three independent in an un-bounded domain; Solution of one class of fredholm integral equations; Stability of abstract galerkin method; Asymptotic behavior of values of bilinear forms, connected with degenerate elliptic equations; Concerning the questions of determination of maximum wind velocity in a given interval of time; Calculation of tidal deviation of a plumb line from the vertical in the astronomical determination of time; Temperatures of hot white dwarfs; Device for measurement of rapidly changing temperatures.
AD-658 392 HC$3.00 MF$0.65

ANALOG TECHNIQUE FOR OPTIMIZING DYNAMIC SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 17.
BNWL-392 HC$3.00 MF$0.65

TABLES RELATING TO MATHIEU FUNCTIONS: CHARACTERISTIC VALUES, COEFFICIENTS, AND JOINING FACTORS.
Applied Mathematics Series.
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
1 Aug 67, 352p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $3.25.

Descriptors: (*Special functions (Mathematical), Tables), (*Differential equations, Tables), Loudspeakers, Diffusion, Vibration, Diffraction, Oscillation, Stability, Waveguides, Periodic variations, Bessel functions, Convergence, Series, Mathematics.
Identifiers: Wave equation.

Early in 1965, the first edition of the present tables, which had been published as CUP 13, became out of print. In providing this second edition of these tables as AMS59, the National Bureau of Standards deemed it best to make no essential changes in the format of the tables or the introductory material; however, a few misprints in the first edition have been corrected. The main change is the inclusion of the article, 'Table of characteristic values of Mathieu's equation for large values of the parameter,' by Gertrude Blanch and Ida Rhodes, from the Journal of the Washington Academy of Sciences, Volume 45, No. 6, 166-196, June 1955. The table and its prefatory material are reproduced without change, except for renumbering and the correction of misprints. The bibliography has been updated by the addition of the six most important texts and tables published on the Mathieu function since 1951. These contain bibliographies of papers published up to 1964.
NBS-AMS-59 HC$3.25 MF$0.65

REPORTS ON THE METHODS OF THE STEEPEST DESCENTS IN THE LINEAR OPERATOR THEORY.
Beitraege Zur Methode des Steilsten Abstieges in Der Theorie Der Linearen Operatoren
Kernforschungsanlage, Juelich (West Germany). Zentralinstitut Fuer Angewandte Mathematik.
W. Petry. Dec 66, 32p JUL-443-MA
in German

Descriptors: *Functional analysis, *Hilbert space, *Integral operator, *Linear equation, *Steepest descent method, Analysis, Characteristic, Descent, Differential, Eigenvalue, Element, Equation, Functional, Integral, Linear, Mathematics, Method, Operator, Space, Steepness, Theory.

For abstract, see STAR 05 20.
N67-34131 HC$3.00 MF$0.65

METHODS OF THE STEEPEST DESCENTS.
Zur Methode des Steilsten Abstieges
Kernforschungsanlage, Juelich (West Germany). Zentralinstitut Fuer Angewandte Mathematik.
W. Kolar. Dec 66, 29p JUL-445-MA
in German

Descriptors: *Differential equation, *Polynomial, *Steepest descent method, Analysis, Complex, Computation, Descent, Differential, Equation, Euler equation, Fall, Fortran, Line, Method, Numerical, Position, Runge-kutta method, Zero.

For abstract, see STAR 05 20.
N67-34163 HC$3.00 MF$0.65

SUM RULES IN THE GEMINAL EXPANSION OF MANY-ELECTRON WAVEFUNCTIONS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 20J.
For abstract, see STAR 05 20.
N67-34173 HC$3.00 MF$0.65

TABLES OF JOINT PROBABILITIES USEFUL IN EVALUATING MIXED ACCEPTANCE SAMPLING PLANS.
Rutgers Univ., New Brunswick, N. J. Statistics Center.
H. F. Dodge, and E. G. Schilling. May 67, 57p
NASA-CR-87424, N-28
Contract NONR-404/18/

Descriptors: *Probability distribution, *Statistical probability, *Table, Acceptance, Defect, Distribution, Evaluation, Fraction, Joint, Number, Plan, Probability, Sampling, Statistical, Value.

For abstract, see STAR 05 20.
N67-34190 HC$3.00 MF$0.65

ON A GENERALIZATION OF THE ABEL INTEGRAL EQUATION.
Ueber Eine Verallgemeinerung Der Abelschen Integralgleichung
Kernforschungsanlage, Juelich (West Germany). Zentralinstitut Fuer Angewandte Mathematik.
H. Neunzert, and J. Wick. Dec 66, 27p JUL-442-MA
in German

Descriptors: *Integral equation, *Laplace transform, *Linear equation, Abel function, Analysis, Approximation, Convergence, Differential, Equation, Function, Generalization, Integral, Linear, Mathematics, Polynomial, Theory, Transform.

For abstract, see STAR 05 20.
N67-34244 HC$3.00 MF$0.65

APPROXIMATE SOLUTIONS OF RUNGE-KUTTA EQUATIONS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
J. S. Rosen. Aug 67, 33p NASA-TN-D-4082

Descriptors: *Approximation method, Approximation, Equation, Higher order, Integration, Mathematics, Matrix, Method, Reduction, Runge-kutta method, Solution, Substitution, Transformation.

For abstract, see STAR 05 20.
N67-34881 HC$3.00 MF$0.65

A NEW CLASS OF SUBHARMONIC SOLUTIONS TO DUFFING'S EQUATIONS.
College of Aeronautics, Cranfield (England).
P. A. Christopher. Mar 67, 55p COA-AERO-195

Descriptors: *Differential equation, *Duffing equation, *Fourier series, *Nonlinear equation, Analysis, Differential, Equation, Existence, Mathematics, Nonlinear, Numerical, Proof, Solution, Subharmonic.

For abstract, see STAR 05 20.
N67-34905 HC$3.00 MF$0.65

THE CONSTRUCTION OF DIGRAM-BALANCED LATIN SQUARES.
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
W. A. Wagenaar. 1967, 9p TDCK-48386, IZF-1967-11

Descriptors: *Mathematics, *Problem solving, Algebra, Matrix, Solution.

For abstract, see STAR 05 20.
N67-34932 HC$3.00 MF$0.65

FREDHOLM THEORIES IN VON NEUMANN ALGEBRAS.
Technical rept.,
Kansas Univ., Lawrence. Dept. of Mathematics.
Manfred Breuer. Jun 67, 25p TR-13
Grant NSF-GP-3460

Descriptors: (*Algebras, *Operators (Mathematics)), Hilbert space, Theorems, Sequences, Mapping (Transformations), Groups (Mathematics).
Identifiers: von Neumann algebras.

The theory of compact and of Fredholm operators of a Hilbert space has been generalized in various directions by several authors. In the present paper the foundations of a generalization of this theory to von Neumann algebras are laid. This generalization depends heavily on the notion of the finiteness of a projection relative to a von Neumann algebra.
PB-175 684 HC$3.00 MF$0.65

BAYESIAN ESTIMATION OF MEANS FOR THE RANDOM EFFECT MODEL.
Technical rept.,
Wisconsin Univ., Madison. Dept. of Statistics.
G. E. P. Box, and G. C. Tiao. May 67, 16p TR-117
Grant NSF-GP-6519

Descriptors: (*Statistical analysis, Mathematical models), Sampling, Distribution theory, Numerical analysis, Probability.
Identifiers: Density functions.

The problem of estimating the means in the one-way random effect model y sub jk = theta sub j + e sub jk is considered from a Bayesian viewpoint. Posterior distributions of the theta sub j's are obtained under the assumption that theta sub j are independently drawn from a Normal population N (theta, sigma subscript 2 superscript 2) and that e sub jk are independent random errors having a N (0, sigma subscript 1 superscript 2) distribution. It is shown that the posterior distribution of the theta sub j's are clustered more closely together than are the corresponding distributions for a fixed effect model. A numerical example is given. (Author)
PB-175 691 HC$3.00 MF$0.65

SIMPLIFIED TECHNIQUES FOR ESTIMATING PARAMETERS OF SOME GENERALIZED POISSON DISTRIBUTIONS.
Technical rept.,
Wisconsin Univ., Madison. Dept. of Statistics.
Paul Hinz, and John Gurland. Apr 67, 46p TR-112
Contract PHS-CA-08086-02

Descriptors: (*Probability, Distribution theory), (*Statistical processes, Least squares method), Transformations (Mathematics), Matrix algebra, Random variables, Mathematical analysis.
Identifiers: Maximum likelihood, Poisson distribution.

Three similar procedures for parameter estimation are investigated for the Negative Binomial, Neyman Type A, Poisson Pascal, and Poisson Binomial distributions. These procedures are based on h-functions, h-functions combined with an a-function of the zero frequency, and l-functions. The estimators so obtained are of the same form as weighted least squares. In comparing the estimation procedures for a given number of functions, use of h sub 0, h sub 1, ..., h sub s, a sub i) generally results in the highest asymptotic relative efficiency. In some parts of the parameter space of the Poisson Binomial distribution, the l-functions have the highest efficiency. The use of two or three h-functions together with an a-function is very effective and yields fittings that rival maximum likelihood. A graphical procedure based on the h- and l-functions for helping to choose among the four distributions is also presented. In making such a choice in the absence of preliminary information about the relevant underlying distribution, this graphical procedure has some merit. (Author)
PB-175 732 HC$3.00 MF$0.65

TABLE Y = ANTILOG X/20.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 14B.
PB-175 765 HC$3.00 MF$0.65

THEORY OF NORMS.
Technical rept.,
Stanford Univ., Calif. Dept. of Computer Science.
F. L. Bauer. 31 Aug 67, 139p CS-75
Supported in part by a grant from NSF.

Descriptors: (*Vector spaces, *Mapping (Transformations)), Groups (Mathematics), Invariance, Inequalities, Rings (Mathematics), Matrix algebra, Hilbert space, Theorems.
Identifiers: Eigenvalues.

Contents: Vector spaces; Normed vector spaces; Homogeneous norms; Linear mappings; Subadditive functionals generated by a set of linear functionals; Replete generating sets. Application: Fields of values and eigenvalue exclusion theorems; Norms transformations and invariance groups; Suprema and infima in ordered vector spaces; Subadditive mappings generated by a set of linear mappings; Mappings of normed vector spaces; Least upper and greater lower bounds I; Dual norms; Least upper and greater lower bounds II; Best lower bounds in the sense of Robert; Applications: Nonsingularity criteria and eigenvalue exclusion theorems; Submultiplicative functionals on half-categories and semigroups: Normed categories and rings.
PB-175 793 HC$3.00 MF$0.65

CHEBYSHEV APPROXIMATION OF CONTINUOUS FUNCTIONS BY A CHEBYSHEV SYSTEM OF FUNCTIONS.
Technical rept.,
Stanford Univ., Calif. Dept. of Computer Science.
G. H. Golub, and L. B. Smith. 28 Jul 67, 57p CS-72

Descriptors: (*Minimax technique, Approximation (Mathematics)), Algorithms, Polynomials, Iterative methods, Convergence, Computer programs, Numerical methods and procedures.
Identifiers: Chebyshev systems, Algol.

The second algorithm of Remez can be used to compute the minimax approximation to a function, f (x), by a linear combination of functions, (Q sub i (x)) subscript O, superscript N, which form a Chebyshev system. The only restriction on the function to be approximated is that it be continuous on a finite interval (a,b). An Algol 60 procedure is given which will accomplish the approximation. This implementation of the second algorithm of Remez is quite general in that the continuity of f (x) is all that is required whereas previous implementations have required differentiability, that the end points of the interval be 'critical points,' and that the number of 'critical points,' be exactly N+2. Discussion of the method used and its numerical properties is given as well as some computational examples of the use of the algorithm. The use of orthogonal polynomials (which change at each iteration) as the Chebyshev system is also discussed. (Author)
PB-175 810 HC$3.00 MF$0.65

HYPERGEOMETRIC AND LEGENDRE FUNCTIONS WITH APPLICATIONS TO INTEGRAL EQUATIONS OF POTENTIAL THEORY.
Applied mathematics series,
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
Chester Snow. 1 May 52, 441p AMS-19

Descriptors: (*Potential theory, Integral equations), (*Hypergeometric functions, Reviews), (*Special functions (Mathematical), Reviews), Transformations (Mathematics), Complex variables, Differential equations, Power series, Polynomials, Boundary value problems, Mathematics.
Identifiers: Wave equation.

This is an outline of the theory of, and a collection of formulas pertaining to, the ordinary hypergeometric function with especial reference to the associated Legendre functions. The linear and quadratic transformations and analytic continuations of the hypergeometric function of z to all parts of the z-plane are written out at great length and for unrestricted values of its three parameters. Section VI is an attempt to make accessible those transformations and properties of associated Legendre functions of general argument and parameters which are most commonly required in physics, without trespassing upon the proper ground of treatises devoted to the theory of these functions. In the present revised edition section VIII has been rewritten and expanded with new examples of integrals with hypergeometric functions, as well as integrals of cylinder functions with respect to their argument and also those with respect to their parameter. Application of the latter is made to the wave equation. The last application in section X, on annular coordinates, has been rewritten, with examples of annular type and of the complementary (or aperture) type. These furnish new addition theorems for the Q-function. A final chapter on confluent hypergeometric functions has been added.
PB-175 815 HC$3.00 MF$0.65

INTRODUCTION TO THE THEORY OF STOCHASTIC PROCESSES DEPENDING ON A CONTINUOUS PARAMETER.
Applied mathematics series,
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
Henry B. Mann. 11 Feb 53, 51p AMS-24

Descriptors: (*Stochastic processes, Reviews), (*Measure theory, Stochastic processes), Random variables, Distribution functions, Probability, Sequences, Convergence, Fourier analysis.

Contents: Fundamental concepts: Random variables, convergence, stochastic processes, convergence in the mean, differentiation, stochastic processes of second order, integration; Special processes: The fundamental random process, further properties of the F.R.P, frictional effects. The Ornstein-Uhlenbeck process; Estimation of parameters: Estimation of the parameter of F.R.P, F.R.P. with mean value function, estimation of parameters for the O.U.P.; The general differential process; Differential processes modified by mechanical devices: Filter effect, counter data; The Fourier analysis of stochastic processes: General theory, trigonometric expansion of the F.R.P., stationary processes, the mean ergodic theorem.
PB-175 816 HC$3.00 MF$0.65

TABLES OF COEFFICIENTS FOR THE NUMERICAL CALCULATION OF LAPLACE TRANSFORMS.
Applied mathematics series,
National Bureau of Standards, Washington, D. C.
Herbert E. Salzer. 24 Sep 53, 37p AMS-30

Descriptors: (*Integral transforms, Tables), Exponential functions, Numerical methods and procedures, Approximation (Mathematics), Polynomials, Mathematics.

The tables presented herein serve to facilitate the numerical evaluation of infinite integrals expressible in the form of Laplace transforms, such as arise in the theory of heat conduction and in various branches of electrical engineering. Contents include the following: Lagrange interpolation coefficients, 2-point through 11-point; Laplace transforms of interpolation coefficients, 2-point through 11-point; Laplace transforms of Lagrange coefficients, 2-point through 11-point; n factorial/p to the (n+1) power, n=0 (1)10, p=0.1 (.1)10.
PB-175 817 HC$3.00 MF$0.65

STATISTICAL THEORY OF EXTREME VALUES AND SOME PRACTICAL APPLICATIONS. A SERIES OF LECTURES.
Applied mathematics series,
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
Emil J. Gumbel. 12 Feb 54, 58p AMS-33

Descriptors: (*Sampling, *Statistical analysis), Probability, Distribution theory, Control, Floods, Climatology, Aeronautics, Quality control, Radioactivity, Life expectancy, Bacteria.
Identifiers: Extreme-value problem.

This monograph is based on four lectures given at the National Bureau of Standards under the sponsorship of the Applied Mathematics Division. The aim of this publication is to make the statistical theory and techniques of extreme values readily available to scientists and engineers. This seems necessary because the original papers, partly written in foreign languages and published in remote journals, are not easy to find. The first lecture outlines some of the practical problems to which the theory pertains. The second lecture introduces certain new statistical tools necessary for the theory, which is developed in the third lecture, first in exact, then in asymptotic form. The fourth lecture shows a series of practical applications and gives all numerical details for enabling interested readers to apply the method to their own problems.
PB-175 818 HC$3.00 MF$0.65

EXPERIMENTS IN THE COMPUTATION OF CONFORMAL MAPS.
Applied mathematics series,
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
John Todd. 20 Jan 55, 64p AMS-42

Descriptors: (*Conformal mapping, Numerical methods and procedures), Integral equations, Approximation (Mathematics), Potential theory, Convergence, Operators (Mathematics), Inequalities, Functions, Iterative methods, Theorems, Polynomials.
Identifiers: Density functions.

Contents: Conformal mapping of a special ellipse, on the unit circle; Theodorsen's and Garrick's method for conformal mapping of the unit circle into an ellipse; On the solution of the Lichtenstein-Gershgorin integral equation in conformal mapping: Theory and computational experiments; Two numerical methods in conformal mapping; Computation of harmonic measure.
PB-175 819 HC$3.00 MF$0.65

TABLES OF THE BESSEL-KELVIN FUNCTIONS ber, bei, ker, kei, AND THEIR DERIVATIVES FOR THE ARGUMENT RANGE 0 (0.01)107.50.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Herman H. Lowell. 13 Mar 59, 295p NASA-TR-R-32
AD-225 746

Descriptors: (*Bessel functions, Tables), Special functions (Mathematical), Series, Heat transfer, Stresses, Electromagnetic waves, Accuracy.
Identifiers: Bessel-Kelvin functions, Ber functions.

Tables of the Bessel-Kelvin functions ber, bei, ker, kei, and their derivatives were calculated. Self-checking digital computing and tabulating equipment was used. The argument range is 0 to 107.50 at an interval of 0.01. For ber, bei, ber', and bei', the number of significant figures is either 13 or 14 for the two absolutely larger functions but is generally less for the remaining two. For ker, kei, ker', and kei', the number of significant figures varies from a minimum of 9 for the absolutely largest function at arguments near 9.00 to a maximum of 14 elsewhere; 13 or 14 is achieved for all arguments greater than 13.15 and less than 3.72. Each of the functions is presented in the tables as a product of two factors. Normal series (ascending powers of the argument) were used for ber, bei, and derivatives over the argument range 0 to 14.99; beyond that, asymptotic series (including certain negative exponential terms usually neglected) were used.
PB-175 833 HC$3.00 MF$0.65

TABLES OF NORMAL PROBABILITY FUNCTIONS.
Applied Mathematics series.
National Bureau of Standards, Washington, D. C. Applied Mathematics Div.
5 Jun 53, 353p AMS-23

Descriptors: (*Distribution functions, Tables), (*Probability, Tables), Statistical functions, Accuracy, Statistical tests, Approximation (Mathematics), Exponential functions.

The volume contains tables of the normal probability functions Q (x) = (1/the square root of 2 pi) (e to the power (- x squared /2)), and P (x) = (1/the square root of 2 pi) (the integral between (-x) and x of the quantity (e to the power (-alpha squared/ 2)d (alpha)) the functions Q (x) and P (x) are tabulated to 15 decimal places, at intervals of 0.0001 in the range of x between 0 and 1, and at intervals of 0.001 for x ranging between 1 and 7.8. For larger values of x, the functions converge rapidly to 0 and 1, respectively, and their values to 15 decimels may be read by inspection from the last page of table I.
PB-175 967 HC$3.00 MF$0.65

12B. Operations Research

ON THE CHOICE OF OBJECTIVES IN SYSTEMS STUDIES,
RAND Corp., Santa Monica, Calif.
Charles J. Hitch. 30 Mar 60, 14p P-1955

Descriptors: (*Decision theory, Economics), Optimization, Analysis, Costs, Feasibility studies, Operations research.

The author concludes that we must broaden our horizons and ambitions. In the hierarchy of ends and means there is no essential difference among levels, or between means and ends. The systems analyst may be able to make contributions at high levels as well as low; and may frequently be unable to contribute at low unless he also contributes at high. This is a challenge and opportunity. If there is to be any clarification of objectives for systems studies, any gain in their concreteness, detail, and operational usefulness, we are going to have to do the clarifying. No one else can help much. And we have tools to use if we can rid ourselves of dogma and false hopes for tidy, authoritarian or external solutions.
AD-224 317 HC$3.00

DISCOUNTED PRODUCTION SCHEDULING AND EMPLOYMENT SMOOTHING.
Technical rept.,
Stanford Univ Calif Graduate School of Business
Steven A. Lippman, and John S. C. Yuan. Aug 67, 27p Rept no. TR-21
Contract Nonr-225 (77), Grant NSF-GS-552

Descriptors: (*Inventory control, Costs), (*Production control, Costs), (*Employment, Costs), Management planning, Optimization, Mathematical models, Algorithms, Decision making, Operations research, Theorems.

The report discusses the problem of minimizing the sum of production, employment smoothing, and inventory costs over a finite number of time periods. We require that the known demands be met each period. There are two modes of production, termed regular-time and overtime, the latter constrained to be no greater than a fixed proportion of the work force. We also permit a distinction between the amount of labor employed at regular-time and the level of the work force. There is a piece-wise linear cost associated with fluctuations in the work force, a nondecreasing inventory holding cost, and a production cost which subsumes convexity in the levels of regular-time, over-time, and work force.
AD-657 624 HC$3.00 MF$0.65

ON THE GEOMETRY OF OPTIMAL STRATEGIES IN TWO-PERSON GAMES OF KIND. PART II,
California Univ Berkeley Dept of Mechanical Engineering
Austin Blaquiere, and Francoise Gerard. Jul 67, 98p Rept no. AM-67-7
Contract Nonr-3656 (31)
Prepared in cooperation with Paris Univ. (France). Laboratoire d'Atomatique Theorique.

Descriptors: (*Game theory, Optimization), (*Operations research, Stability), Control systems, Geometry, Vector analysis, Curve fitting, Mapping (Transformations), Symbols, Theorems, Saddle point method.

In the report the theory of games of kind is developed in the case of single target problems where strategies are piece-wise continuous functions of time. The delineation of escape and capture zones and the properties of paths along the boundary that separates them are studied. Some connections between theory of games and theory of stability are examined, they are illustrated by a few examples. The connections between games of kind and games of degree are also analyzed.
AD-657 635 HC$3.00 MF$0.65

FREQUENCY-DOMAIN INSTABILITY CRITERIA FOR TIME-VARYING AND NONLINEAR SYSTEMS.
Revised ed.,
Massachusetts Inst of Tech Cambridge Dept of Electrical Engineering
R. W. Brockett, and H. B. Lee. 15 Mar 67, 16p
Contract DA-36-039-AMC-03200 (E), Grant NGR-22-009 (124)
Revision of manuscript submitted 19 Dec 66.
Availability: Published in Proceedings of the IEEE v55 n5 p604-19 May 1967.

Descriptors: (*Control systems, Stability), Nonlinear systems, Theory, Locus, Feedback, Gain, Time.

Recent research has produced a number of frequency-domain stability criteria applicable to linear systems having nonlinear and/or time-varying feedback. One of the more interesting of these stability criteria is the so-called Circle Criterion which represents a generalization of the familiar result of Nyquist. The present paper provides a basis for generating instability counterparts of most of the available frequency-domain stability criteria. The procedure is described in detail for the Circle Criterion. Once the general pattern is established, it becomes a simple matter to generate instability counterparts of other similar stability criteria. Several worked examples are included to illustrate the theory. (Author)
AD-657 909 Not available from CFSTI.

SELECTING A HAREM-AND OTHER APPLICATIONS OF THE POLICY-CAPTURING MODEL,
Personnel Research Lab Lackland AFB Tex
For primary bibliographic entry see Field 5J.
AD-658 025 HC$3.00 MF$0.65

THEORY OF LAGRANGE MULTIPLIERS FOR CONSTRAINED OPTIMIZATION PROBLEMS.
Research Analysis Corp Mclean Va
For primary bibliographic entry see Field 12A.
AD-658 068 HC$3.00 MF$0.65

SECOND-ORDER CONDITIONS FOR CONSTRAINED MINIMA.
Research Analysis Corp Mclean Va
For primary bibliographic entry see Field 12A.
AD-658 069 HC$3.00 MF$0.65

HOW TO SOLVE LINEAR INEQUALITIES,
California Univ Berkeley Operations Research Center
For primary bibliographic entry see Field 12A.
AD-658 095 HC$3.00 MF$0.65

A GRAPHICAL METHOD OF DETERMINING THE STABILITY CHARACTERISTIC OF A SYSTEM CONTAINING TWO NONLINEAR ELEMENTS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. G. Chubbuck. 8 Jun 54, 29p Rept no. CF-2222
Contract NOrd-7386

Descriptors: (*Control systems, Stability), (*Graphics, Control systems), Determination, Nonlinear systems, Simulation, Determinants.

A graphical method is shown of finding the roots of equation: The determinant whose element in the jth row and nth column is f sub jn = o, when two nonlinear elements are present in the system. This method consists of calculating the response of the system at a finite number of points in the amplitude-frequency plane. From these calculations, the system may be graphically expressed in terms of amplitude and frequency contours in the gain-phase plane. (Author)
AD-658 127 HC$3.00 MF$0.65

A FRAMEWORK FOR THE PREDICTION OF HIGHWAY VEHICLE OPERATING CONSEQUENCES.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-175 762 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

A PHYSICAL COMPARATOR FOR THE COLOR TEMPERATURES OF INCANDESCENT LAMPS.
Johns Hopkins Univ Baltimore Md Engineering Lab
For primary bibliographic entry see Field 9E.
AD-657 618 HC$3.00 MF$0.65

A RESEARCH STUDY ON INTERNAL CORROSION OF HIGH PRESSURE BOILERS.
Combustion Engineering Inc Windsor Conn Kresinger Development Lab
For primary bibliographic entry see Field 11F.
AD-657 865 HC$3.00 MF$0.65

WIPED FILM CONDENSATION.
Navy Marine Engineering Lab Annapolis Md
For primary bibliographic entry see Field 7D.
AD-657 940 HC$3.00 MF$0.65

THE EXPERIMENTAL DETERMINATION OF AERODYNAMIC TOTAL-PRESSURE LOSSES FOR HEAT-EXCHANGER SURFACES CONSIDERED FOR THE 7- BY 10-FOOT TRANSONIC WIND TUNNEL,
David Taylor Model Basin Washington D C Aerodynamics Lab
For primary bibliographic entry see Field 14B.
AD-658 331 HC$3.00 MF$0.65

HEAT TRANSFER IN ROTATED ARCS WITH WATER-COOLED ELECTRODES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Spencer D. Raezer. 5 Dec 61, 19p Rept no. CF-2957
Contract NOrd-7386

Descriptors: (*Heat transfer, *Electric arcs), (*Arc heaters, Wind tunnels), Rotation, Cooling, Water, Electrodes, Plasma physics, Erosion, Heating, Surfaces.

In the range of Q (1,000,000 watts/sq cm and higher) for the operation of wind tunnel heaters, it is doubtful that the arc can be rotated with sufficient rapidity to eliminate surface melting and vaporization. The problem encountered differs from the more commonly met steady-state heating of a water-cooled wall in two basic respects: (1) the magnitude of the heat flux into the wall in the range of interest greatly exceeds that which can be supported in practice by the wall to coolant interface, and (2) heating is extremely short in duration and periodic. This means that whereas normally in the case of steady-state heating of a well-cooled wall the surface temperature can be kept below melting by making the wall appropriately thin, in our case thinning the wall can have the effect of causing its destruction by increasing the local flux to the coolant over that which can be safely transferred without film boiling. As the flux to the wall is increased, the wall should be thickened since it acts as a kind of 'capacitive-resistive' buffer-zone between the arc and coolant as is evident from the analysis. However, it is also necessary to increase the arc path length (duration of the cooling time tau) to keep the average wall temperature down. Because of this and because of the loss of wall material resulting from erosion, thick electrode walls and long arc path lengths are suggested. However, long path length means larger electrodes and a larger pressure vessel to contain them unless a means can be found for causing the arc to wander over a more devious path during a period to utilize the electrode area more effectively. (Author)
AD-658 373 HC$3.00 MF$0.65

STANDARD REFERENCE MATERIALS: RECOMMENDED METHOD OF USE OF STANDARD LIGHT-SENSITIVE PAPER FOR CALIBRATING CARBON ARCS USED IN TESTING TEXTILES FOR COLORFASTNESS TO LIGHT,
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
For primary bibliographic entry see Field 11L.
NBS-MISC-PUB-260-15 HC$0.20 MF$0.65

PRESENTATION AND TESTING OF THE MATHEMATICAL MODEL FOR THE OPERATING DATA OF A STEAM-HEATED BOILER TUBE CLUSTER HEAT EXCHANGER.
Aufstellung Und Pruefung des Mathematischen Modells Fuer Die Betriebsdaten Eines Dampf-Beheizten Rohrbuendelwaermeuebertragers
Technische Hochschule Munchen (West Germany).
H. Zimmermann. 1966, 146p
in German

Descriptors: *Heat transmission, *Mathematical model, *Tube heat exchanger, Bibliography, Distribution, Equation, Exchanger, Flow, Heat, Heat transfer, Loss, Mathematics, Model, Pressure, Steam, Temperature, Transmission, Tube.

For abstract, see STAR 05 20.
N67-34404 HC$3.00 MF$0.65

THERMAL INSULATION OF METAL FOIL FOR THE CASE OF CIRCULAR PIPE FLOW.
National Aerospace Lab., Tokyo (Japan).
K. Inouye. 1967, 13p NAL-TR-129
in Japanese, English Summary

Descriptors: *Circular tube, *Heat transfer, *Liquid flow, *Metal foil, *Thermal insulation, Circle, Flow, Foil, Insulation, Liquid, Metal, Pipe, Thermal, Tube.

For abstract, see STAR 05 20.
N67-34564 HC$3.00 MF$0.65

AN INTERIM REPORT ON A STUDY OF DISABILITY VEILING BRIGHTNESS.
Research rept.,
Texas Transportation Inst., College Station.
Neilon J. Rowan, Hans C. Jensen, and Ned E. Walton. Jun 67, 47p RR-75-5
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Illumination), Lighting equipment, Brightness, Vision, Intensity, Visibili-

ty, Pavements, Measurement, Photometers, Reflection.

The report covered the results of a study to determine the disabling veiling brightness of selected roadway lighting systems of 1000 watt luminaires and the effect of mounting height on disabling veiling brightness for 400 and 1000 watt luminaires. (Author)
PB-175 750 HC$3.00 MF$0.65

13B. Civil Engineering

IODINE, BROMINE, AND CHLORINE IN WINTER AEROSOLS AND SNOW FROM BARROW, ALASKA,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
For primary bibliographic entry see Field 4A.
AD-657 724 Not available from CFSTI.

LEAD AND HALOGENS IN POLLUTION AEROSOLS AND SNOW FROM FAIRBANKS, ALASKA,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
For primary bibliographic entry see Field 4A.
AD-657 726 Not available from CFSTI.

COHERENCE OF IODINE AND BROMINE IN THE ATMOSPHERE OF HAWAII, NORTHERN ALASKA, AND MASSACHUSETTS,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
For primary bibliographic entry see Field 4A.
AD-657 727 Not available from CFSTI.

OPTIMIZATION OF A REVERSE OSMOSIS SEA WATER DESALINATION SYSTEM.
Universal Water Corp Del Mar Calif
For primary bibliographic entry see Field 7A.
AD-657 855 HC$3.00 MF$0.65

DEVELOPING A SET OF CBR DESIGN CURVES.
Rept. on Instruction no. 4,
Army Engineer Waterways Experiment Station Vicksburg Miss
R. G. Ahlvin. Nov 59, 28p

Descriptors: (*Pavements, *Design), (*Graphics, Design), Flexible structures, Loading (Mechanics), Airports, Thickness.

The CBR pattern is portrayed by either the CBR equation or the combined CBR curve. Either presents a single relation (equation or curve) that is essentially a combination of all empirically developed CBR design criteria resulting from Corps of Engineers research. Previous studies have shown that either portrayal truly presents the CBR pattern in the low CBR range for single-wheel loads. This report shows how, beginning with the pattern for the low CBR range, the combined CBR curve, supplemented by related information and judgment, can be used to extend single-wheel relations into the high CBR range. It also shows how, by the use of equivalent single-wheel loads, the single-wheel design criteria can be applied to any multiple-wheel configuration. Finally, means are indicated for further extending either single- or multiple-wheel design criteria to criteria for intense usage or for various levels of limited usage based on load repetitions (coverages). An appendix provides a detailed example of the method by which theoretical maximum deflections are developed for single- and multiple-wheel assemblies and combined to establish a relation between multiple- and single-wheel loads. (Author)
AD-658 078 HC$3.00 MF$0.65

ECONOMIC BASE SURVEY OF THE POTOMAC RIVER SERVICE AREA. VOLUME IX, APPENDIX L. POTOMAC RIVER BASIN REPORT.
Office of Business Economics Washington D C
For primary bibliographic entry see Field 5C.
AD-658 165 MF$0.65

MICROBIOLOGICAL STUDIES OF AQUATIC HABITATS OF THE AREA OF INUVIK, NORTHWEST TERRITORIES.
Arctic Inst of North America Washington D C
For primary bibliographic entry see Field 6M.
AD-658 302 Not available from CFSTI.

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 6I.
For abstract, see STAR 05 20.
N67-35081 HC$3.00 MF$0.65

HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPORS, RADIOACTIVE PARTICLES.
Israel Program for Scientific Translations, Ltd., Jerusalem.
H. Schneider. 1966, 77p
Transl. Into English From Vdi (Ver. Deut. Ingr.) Z. (Dusseldorf), V. 26, No. 11, Nov. 1966

Descriptors: *Aerosol, *Air pollution, *Dust collector, *Industrial safety, *Radioactive particle, Air, Collector, Dust, Electrostatic, Filter, Industry, Oxide, Particle, Pollution, Precipitation, Radioactivity, Safety, Silicon.

For abstract, see STAR 05 20.
N67-35101 HC$3.00 MF$0.65

THE MEASUREMENT OF NON-USER BENEFITS IN FREEWAY PLANNING.
Final rept.,
California Univ., Berkeley. Center for Planning and Development Research.
Phoebe H. Cottingham. Oct 66, 126p Rept. no. 0877
Prepared in cooperation with the Bureau of Public Roads, Washington D. C.

Descriptors: (*Roads, Design), Recreation, Costs, Population, Measurement, Tables, Urban areas, Statistical analysis, Public opinion, California.

The study had two stated purposes: To determine the effect of freeways on parks, and To determine the reaction of communities and groups to various right-of-way acquisitions and other freeway effects. Parks: The study developed a preliminary model for the examination of the impact of freeways on neighborhood parks; however, the report notes that the concept could be used for other types of parks with minor changes of emphasis. Public reaction: The principal findings on this point were: (a) Groups representing larger sectors of the community (government bodies) tend to be more active than special interest groups (property owners associations) in expressing opinions on proposed freeway locations; (b) Special interest groups (e.g., home owners) react according to the impact of the freeway on their special interest; and (c) There is considerable agreement in the response of community groups to freeway planning, especially in the expression of preferences for routes other than the one recommended by the State highway engineer. (Author)
PB-175 631 HC$3.00 MF$0.65

NON-INSTITUTIONAL HOUSING FOR THE ELDERLY,
National Swedish Inst. for Building Research, Stockholm.
For primary bibliographic entry see Field 5K.
PB-175 667 HC$3.00 MF$0.65

URBANDOC THESAURUS.
New York Univ., N. Y.
For primary bibliographic entry see Field 5B.
PB-175 702 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. INTERIM REPORT I: PRELIMINARY PLANNING,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
For primary bibliographic entry see Field 8M.
PB-175 739 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. INTERIM REPORT II: ACCESS TUBE INSTALLATION
Oklahoma State Univ., Stillwater. School of Civil Engineering.
For primary bibliographic entry see Field 8M.
PB-175 740 HC$3.00 MF$0.65

DEVELOPMENT AND DEMONSTRATION OF IMPROVED ENGINEERING PRODUCTIVITY FOR THE DESIGN PHASE OF PRE-CONSTRUCTION ENGINEERING.
Franklin Engineering Associates, Ltd., Columbus, Ohio.
May 67, 153p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Engineering), Design, Traffic, Analysis, Terrain, Soils, Drainage, Structural properties, Costs, Road-building equipment, Tables, North Carolina, Ohio.

The purpose of this study was to demonstrate and document a system of operational procedures for pre-construction engineering with the emphasis placed on the use of new and improved techniques and equipment. This was accomplished through two demonstration projects, one each in North Carolina and Ohio. Charts were developed which defined the sequences of pre-construction activities for each state. One chart was developed for Location Studies and five charts with interconnections were developed for the Design phase of pre-construction engineering. The five charts for the Design phase were: Roadway Design and Earthwork; Interchange Design; Drainage Design; Structural Design; and Right-of-Way. Each activity within the chart was defined in detail. Tables were included which listed the input and output requirements of each activity as well as the output information that was retained during the design phase. Each of the up-to-date techniques and equipment used in the demonstration projects was completely defined and the benefits derived from each were discussed. Full utilization of the operational procedures and technological developments as described in the interim and final reports should result in moderate savings in engineering costs. (Author)
PB-175 742 HC$3.00 MF$0.65

THE PRESENTATION OF THE SLOPE-DEFLECTION FOURIER SERIES METHOD FOR THE ANALYSIS OF CURVED ORTHOTROPIC HIGHWAY BRIDGES.
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-175 743 HC$3.00 MF$0.65

THE ANALYSIS OF CURVED ORTHOTROPIC HIGHWAY BRIDGES BY THE FINITE DIFFERENCE TECHNIQUE,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-175 746 HC$3.00 MF$0.65

A FINITE-ELEMENT METHOD OF SOLUTION FOR STRUCTURAL FRAMES.
Texas Univ., Austin. Center for Highway Research.
For primary bibliographic entry see Field 13M.
PB-175 748 HC$3.00 MF$0.65

A FINITE-ELEMENT METHOD FOR BENDING ANALYSIS OF LAYERED STRUCTURAL SYSTEMS.
Texas Univ., Austin. Center for Highways Research.
For primary bibliographic entry see Field 13M.
PB-175 749 HC$3.00 MF$0.65

AN INTERIM REPORT ON A STUDY OF DISABILITY VEILING BRIGHTNESS.
Texas Transportation Inst,, College Station.
For primary bibliographic entry see Field 13A.
PB-175 750 HC$3.00 MF$0.65

COST OF MOWING ROADSIDES IN INDIANA.
Indiana State Highway Commission. Div. of Maintenance.
1966, 35p Rept. no. 0923
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Economics), (*Cutting, *Grasses), Costs, Maintenance, Time, Labor, Personnel, Indiana.

The report presents results of a four year investigation into factors affecting the costs of mowing highway roadsides in Indiana. Chapters I and II briefly describe study objectives and procedure. Chapter III presents data obtained during the 1966 mowing season from four selected Sub-districts. Chapter IV compares the data for the 1966 season with similar data abstracted from progress reports prepared for the 1963, 1964 and 1965 mowing seasons. It then discusses these data and puts forth conclusions about certain factors which affect mowing costs. Chapter IV also discusses the reliability of the basic data and points out the possibility that there were significant errors in some cases. (Author)
PB-175 756 HC$3.00 MF$0.65

MAINTENANCE RESEARCH. REPORT ONE. ORGANIZATION AND OPERATIONS.
Jorgensen (Roy) and Associates, Washginton, D. C.
For primary bibliographic entry see Field 5A.
PB-175 757 HC$3.00 MF$0.65

A STUDY OF MULCHING PROCEDURES AS PERFORMED BY MAINE STATE HIGHWAY COMMISSION MAINTENANCE DIVISION.
Technical paper,
Maine State Highway Commission. Materials and Research Div.
David W. Rand. Feb 67, 58p TP-67-7B
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Maine), (*Construction materials, Roads), Bituminous coatings, Mixtures, Viscosity, Specifications, Moisture, Costs, Analysis, Sampling, Asphalt, Tar, Maintenance, Time.
Identifiers: Aggregates (Materials).

The study consisted of observing the mulching methods used by various mulch crews throughout the State of Maine. The work consisted of observing the conditions of the road prior to mulching; determining the reason why the work was done, and why the particular type and grade of bitumen was used. A time study was undertaken to notice the equipment used, time involved, and methods used by each crew. While observing a particular project, data was also obtained on quantities of aggregate and bitumen used, and the length of project involved. A sample of the completed mixture was also obtained for laboratory analysis to determine gradation, bitumen content, and moisture. As a result of this study it was found that many roads were mulched each year. It was also found that it cost $900 per mile to do this work. This study indicated and recommends that road carrying over 1200 vehicles per day should be surfaced with a hot plant mix surface treatment because mulching does not provide sufficient lasting properties. Roads having less traffic than 1200 vehicles per day should be mulched with a mix produced in a stabilization plant. It is estimated that this method will save $350 per mile over the existing method using graders. This study tends to indicate that mulches composed of tars do not last as well as asphalt base mixes. The reasons for this conclusion were tar mixes were often excessively 'lean'. Tars were used on heavily traveled roads and as a result subjected to excessive wear. Comments from the crew foremen and supervisors indicated that the viscosity method of grading cutbacks was well accepted. It was found that MC-800 was too heavy if it was blended to conform to the middle of the viscosity range in the specifications. It can be used if the viscosity is held below 900 centistokes at 140F. (Author)
PB-175 758 HC$3.00 MF$0.65

STUDY OF TERMINAL TRANSFER FACILITIES IN CONJUNCTION WITH URBAN FREEWAYS.
De Leuw, Cather and Co., Chicago, Ill.
W. R. McConochie. Jun 67, 69p Rept. no. 0852
Prepared in cooperation with Minnesota Dept. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Urban areas), Traffic, Costs, Buildings, Passenger vehicles, Design, Maintenance, Terrain, Structural parts, Construction, Volume, Transportation, Commerce.

The report presents the results of a feasibility study of providing terminal-transfer facilities using air rights above freeways or on land immediately adjacent to freeways. A general study was made, incorporating modular design concepts, site considerations, structural alternates, size limitations as related to ramp capacities, functional design, and cost estimates. An economic analysis using cost per parking space was made, including distribution of costs and comparisons with a possible facility located adjacent to the freeway. General conclusions resulting from the study were as follows: It was shown that it is economically feasible to construct terminal transfer facilities over an expressway. Such a facility should be located in the immediate areas sufficiently close to the downtowns to intercept the largest number of potential users, yet far enough removed to be free of heavy concentrations of business district traffic. Bus operations should be provided under the structure rather than on the parking levels. The maximum number of spaces in a typical facility would be in the range of 1200 to 1600 spaces. The construction of a terminal-transfer facility should be viewed as part of a balanced metropolitan transportation system, and that therefore the cost should be distributed among all beneficiaries. (Author)
PB-175 759 HC$3.00 MF$0.65

HIGHWAY BEAUTIFICATION STUDY: MAINE AND NEW HAMPSHIRE.
Smith (Wilbur) and Associates. New Haven, Conn.
Wilbur S. Smith. 10 Oct 66, 103p Rept. no. 0972
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, New Hampshire), Questionnaires, Design, Economics, Commerce, Law, Tables.

The study dealt with some potential effects of the Highway Beautification Act in Maine and New Hampshire. Findings are presented on the basis of personal interviews with outdoor advertising companies, advertisers, motorists and mail questionnaires to various local officials. Interviews with 174 advertisers using over 900 signs revealed that 17 percent of these signs are not on Interstate or other FAP highways and, therefore, not affected by the Highway Beautification Act. The researchers found that almost three-fourths of the 900 signs are privately owned by the advertisers, the remaining signs were leased from outdoor advertising companies. About 50 percent of the motorists interviewed in Maine answered positively to the question 'Do you use outdoor advertising in your selection of motels, service stations, and scenic attractions.' Highway oriented business managers using outdoor advertising in Maine and New Hampshire were of the opinion that approximately 50 percent of their business was attributable to outdoor advertising. Many of these businessmen indicated that they would attempt to relocate their present signs in permitted areas. In New Hampshire 8 of the 145 communities responding to the mail questionnaires levied a property tax on outdoor advertising structures. In Maine 20 of 89 responding communities levied such taxes. Revenues from property taxes on outdoor advertising signs were generally an insignificant part of total property taxes. (Author)
PB-175 760 HC$3.00 MF$0.65

A FRAMEWORK FOR THE PREDICTION OF HIGHWAY VEHICLE OPERATING CONSEQUENCES.
Research rept.,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
John C. Prokopy. Dec 66, 91p R66-48
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Design), Passenger vehicles, Performance (Engineering), Costs, Volume, Economics, Traffic, Computers, Analysis, Fuels.

The report describes the design of a system which can be used to obtain vehicle operating consequences as related to highway design. Vehicle speeds, acceleration, time, and fuel consumption are predicted for various road, vehicle, and traffic conditions by means of mathematical models that are being included in an integrated highway analysis and design computer system (ROADS). The process of predicting vehicle operating consequences should be given stronger consideration in the total economic analysis process of highway planning and design. Five basic steps in predicting vehicle operating consequences are: definition of vehicles; prediction of driver behavior for each vehicle and segment of roadway; prediction of vehicle performance capabilities; determination of actual travel possibilities for each traffic volume; and prediction of the consequences of vehicle operation for each vehicle, each road segment and each traffic volume level. The structure of the theoretical model of the predicting process was based on factors affecting vehicle operation and performance which were grouped by source and examined for types of relations to operation. The report also includes a review of selected sets of existing methods of predicting vehicle operation. Existing methods are examined both for their similarities to the theoretical model and for their applicability to the development of more extensive prediction models. (Author)
PB-175 762 HC$3.00 MF$0.65

DETERMINATION OF EMBANKMENT DENSITY BY THE SEISMIC METHOD.
Research rept.,
New York State Dept. of Public Works. Bureau of Physical Research.
Robert J. Weaver, and Peter M. Rebull. Jun 67, 86p RR-67-5

Descriptors: (*Foundations (Structures), Roads), (*Soil mechanics, Non-destructive testing), Density, Soils, Seismology, Feasibility studies.

The application of seismic techniques for the measurement of soil density in construction control was examined by extensive field work on actual embankment construction projects. Measurements of soil density and seismic wave velocity were obtained from test platforms, each of which was tested at three states of compaction, loose, intermediate and highly compact. A simple linear relationship between velocity and density was expected. The raw field data show that: (1) individual soils cannot be grouped to afford simple correlation of velocity with density; (2) the relation between velocity and density for a given soil is of a parabolic--not linear--character in the range of interest, and (3) the elastic constants of soils are far more variable than originally supposed, and far more important than the small changes in density.
PB-175 763 HC$3.00 MF$0.65

DEVELOPMENT OF A RAPID FIELD TEST FOR EVALUATING THE EXPANSIVE POTENTIAL OF CLAY SOILS DURING CONSTRUCTION.
California State Div. of Highways. Materials and Research Dept.
For primary bibliographic entry see Field 8M.
PB-175 768 HC$3.00 MF$0.65

MEASURING OF SKID RESISTANCE.
Texas Transportation Inst., College Station.
1966, 22p Bibliography-67-9
Rept. on Survey of Library Facilities Project. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Bibliographies), (*Pavements, Skidding), Surface roughness, Measurement, Surface properties, Friction, Indexes.

The research is a bibliography on the measuring of skid resistance for pavements, the instruments used, the mechanical properties, and prevention of skidding.
PB-175 786 HC$3.00 MF$0.65

BASES FOR FLEXIBLE PAVEMENTS.
Texas Transportation Inst., College Station.
1966, 20p Bibliography-188
Rept. on Survey of Library Facilities Project. Prepared in cooperation with Bureau of Public Roads.

Descriptors: (*Roads, Bibliographies), Tensile properties, Pavements, Hot working, Spectrophotometers, Gas chromatography, Calorimetry, Asphalt, Vibration, Deflection, Glass textiles, Shafts, Traffic, Bituminous coatings, Cracks, Bridges, Measurement, Motor vehicle accidents.

A series of (6) Annotated Bibliographies on various subjects pertaining to Highway Research. The individual areas of library searches are: drilled shafts; tensile testing of road materials; concrete shrinkage and thermal expansion; hot-dip galvanizing; spectrochemical analysis, spectros copy, spectrophotometers, spectrophotometry, photometry, reflectometry, colorimetry, tri-stimulus color, chromatography; fiberglass; design of asphalt treated bases in Colorado; properties of lightweight concrete; vibration of concrete; deflection in flexible pavements; seat belts; theory of traffic flow supplements; rubber in bituminous mixtures; cracks in concrete; measuring of skid resistance; bridge decks; traffic accidents; bases for flexible pavements. (Author)
PB-175 787 HC$3.00 MF$0.65

THE EFFECT OF VISCOSITY OF ASPHALT ON THE PROPERTIES OF BITUMINOUS PAVING MIXTURES. PART I. HARDENING OF ASPHALT IN HOT BITUMINOUS BASE, BINDER, AND SAND MIXTURES.
Final rept.,
North Carolina State Univ., Raleigh. Highway Research Program.
Richard Bright, John Steele, and Alan Justice. Jul 66, 95p
See also PB-175 789.

Descriptors: (*Asphalt, Pavements), Bituminous coatings, Mixtures, Sand, Binders, Hardening, Viscosity, Temperature, Penetration, Traffic, Coatings, Visual inspection, Hardness, Tables.
Identifiers: Aggregates.

The purpose of this investigation was to study the effect of the viscosity of the asphaltic binder on the mixing, laying, and compaction of hot bituminous base, binder, and sand asphalt mixes, and to observe the performance under traffic of test strips laid from these mixes. Four test strips were laid for each of the above mixes in which the mix viscosity of the asphaltic binder was varied from approximately 930 to 40 Saybolt Furol Seconds. Temperatures were measured in the pavement at four different elevations during rolling operations. Ross counts were made on the base and binder mixes as they left the mix box, laying characteristics of the mixes were observed, and densities were measured on the finished pavements. Samples of pavement were taken immediately after laying, after 10 months and after 21 or 22 months, and the asphalt extracted and recovered. Penetrations and viscosities were determined on the recovered asphalts. Ross counts and visual inspection showed incomplete coating of the aggregate for all mixes at the high mix viscosities. Base and binder mixes laid satisfactory at all mix temperatures but the sand asphalt showed some tearing at the higher mix viscosities. There was a slight tendency toward higher densities with higher mix temperatures. There was definitely greater hardening in the mix box with increased mix temperature. However, as the strips aged this relationship showed some change. The base and binder mixes made at 250F showed the least hardening after 10 months and 22 months service. Sand asphalt strips showed similar hardness after 21 months. The thicker pavement layers hardened more slowly than thin layers. (Author)
PB-175 788 HC$3.00 MF$0.65

THE EFFECT OF VISCOSITY OF ASPHALT ON THE PROPERTIES OF BITUMINOUS PAVING MIXTURES. PART II. EARLY HARDENING OF ASPHALT IN HOT BITUMINOUS PAVING MIXTURES.
Final rept.,
North Carolina State Univ., Raleigh. Highway Research Program.
Richard Bright, Alan Justice, and John Steele. Jul 66, 82p
See also PB-175 788.

Descriptors: (*Binders, Hardening), (*Asphalt, *Pavements), Bituminous coatings, Mixtures, Cooling, Viscosity, Temperature, Penetration, Air, Gravity, Sampling, Hardness, Tables.

The investigation was a study of the hardening of the asphaltic binder that occurs in the early life of hot bituminous concrete pavements and in compacted samples cut from the pavements. The rate of hardening was established in hot bituminous wearing surfaces during the first 30 to 60 days of the pavement life. Asphalt of 85-100 penetration grade from four different supply sources and one 170 penetration grade asphalt was used. The hardening of the asphalt in compacted pavement samples was determined when stored at 9F, room temperature, and 140F. The effect of sealing the samples from the air and storing under water was investigated. The effect on the hardening of the rate of cooling of the hot samples was studied. The hardening in the road and in compacted samples varied with the different asphalts used. Hardening occurring in the first 10 days of service was often greater than that occurring in the mixing operation. The hardening of the compacted pavement samples during laboratory storage was very much dependent on temperature. For some of asphalts a sample stored for 20 days at room temperature lost 13% of its penetration. Storing samples under water or at 9F maintained samples close to their original hardness. Sealing samples from the air with thin asphalt layers was not effective in retarding hardening. Rate of cooling had measurable effects on the hardening that occurred. Hardening that had occurred in a few old roads was determined. The asphalt in surface courses of two pavements 15 to 17 years of age showed recovered penetrations of 15 to 18. For other pavements 5 years of age the penetrations of the asphalt varied from 18 to 24. (Author)
PB-175 789 HC$3.00 MF$0.65

MANAGING HIGHWAY MAINTENANCE IN VIRGINIA. PART IV.
Virginia maintenance study 1963-66.
Jorgensen (Roy) and Associates, Gaithersburg, Md.
Dec 66, 360p
Prepared in cooperation with Virginia Dept. of Highways, and Bureau of Public Roads, Washington, D. C. See also PB-172 963, Pt. 1 and PB-170 881, Pt. 2.

Descriptors: (*Roads, Virginia), (*Maintenance, Roads), (*Management engineering, Roads), Management planning, Training, Costs, Labor, Climatology, Soils, Terrain, Materials, Road-building equipment, Manpower, Production, Tables, Maps.

The final report for the Virginia Maintenance Study is divided into several parts. A major portion of the research effort was directed toward defining the maintenance workload in terms which provided a basis for improving the planning, directing and controlling of operations by management. The approach was to modify the existing reporting system in selected residencies to provide actual performance data. These data showed measurable work units for major maintenance activities, labor hours expended in performing all activities, the type of equipment and hours expended in performing all activities, the type of road on which each activity was performed and, labor, equipment and materials costs for all activities. Nine residencies - one in each of the eight districts plus another formed as a result of dividing one of the original eight - were selected as a sample for workload measurement. It was believed that data from these residencies would show the effects of variables such as terrain, soil, climate and road types; however, this premise was not entirely borne out by results. Performance standards were developed in order to provide a basis for determining the resources - manpower, materials and money - needed to provide a specific level of maintenance service in each management unit. These standards were based on results of the workload study, analyses of maintenance activities and experience of the research staff. (Author)
PB-175 811 HC$3.00 MF$0.65

SELECTED EFFECTS OF THE HIGHWAY BEAUTIFICATION ACT OF 1965.
Final rept.,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
Hays B. Gamble, Owen H. Sauerlender, and Gerald Duzinski. 30 Jun 67, 129p
Contract CPR-11-4302

Descriptors: (*Roads, Economics), Passenger vehicles, Salvage, Costs, Employment, Inventory, Money, Design, Recreation, Industries, Commerce, Tables, Pennsylvania.

The specific objectives of the study were as follows: To determine the direct and indirect economic impact of junkyards on Clinton County, Pennsylvania, by means of an input-output model of this county constructed in 1964. To collect de-

tailed cost, income and employment data on approximately fifty junkyards of varying sizes, kinds, and locations (urban and rural) throughout a seven state area in Eastern United States. To ascertain the relationships of land value and land use to distance from junkyards, based on a selected sample of junkyards from above. To compare average land values of junkyards and adjacent properties with average land values of counties in which they are located. To ascertain the costs of different kinds of screening for junkyards, and the costs of relocating junkyards. Estimates of the likely economic effects of screening junkyards, will be made using the Clinton County model. The report contains the findings on all aspects of the research. (Author)
PB-175 812 HC$3.00 MF$0.65

ASPHALT CONCRETE COMPACTION STUDIES USING NUCLEAR DEVICES,
California State Div. of Highways.
Ernest Zube. 9 Mar 67, 26p Rept. no. 0943
Prepared for presentation at the Annual Highway and Public Works Conference (10th), University of the Pacific, Stockton, Calif., March 7-9 1967.
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, *Concrete), (*Asphalt, Pavements), Mixtures, Temperature, Sampling, Particle size, Mechanical properties, Radiation measurement systems, Meters.
Identifiers: Aggregates (Materials).

A summary of studies on compaction of asphalt concrete, and a resume of present work on AC compaction methods is presented. Some of the primary factors influencing compaction of asphalt paving mixtures were found to be temperature of the mixture at various phases of compaction, air temperature, gradation and shape of aggregates, asphalt content of the mixture, and weight of rollers and number of coverages. A discussion of the water permeability test as applied to compaction control of asphaltic pavements is presented. The use of nuclear gages for compaction control of AC, both backscatter and direct transmission types, is discussed. A typical field study of AC rolling is included. Thick lift compaction is covered by a description of a thick lift test section of asphalt concrete, approximately 6,000 feet in length. Conclusions as to temperature effects, types of compaction equipment, effects of additional rolling and compaction control tests are given. (Author)
PB-175 932 HC$3.00 MF$0.65

CLAY MINERALOGY AND CHEMISTRY OF SELECTED WASHINGTON COUNTY, ARKANSAS, SOILS AND EFFECTS ON THEIR ENGINEERING PROPERTIES.
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 8M.
PB-175 953 HC$3.00 MF$0.65

STRIPPING IN HOT - MIXED SAND ASPHALT MIXTURES.
Annual rept.,
Ohio State Univ., Columbus. Dept. of Civil Engineering.
Kamran Majidzadeh, and R. R. Stander, Jr. 1 Jul 67, 49p Rept. no. 0997
Prepared in cooperation with Florida State Road Dept., and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, Mixtures), (*Asphalt, Mixtures), (*Sand, Mixtures), Heat, Creep, Strain (Mechanics), Roads, Compressive properties, Failure (Mechanics), Tests.

In the report an attempt is made to search for the causes of stripping observed in hot-mix sand-asphalt paving mixtures, and to develop a realistic hypothesis and testing procedure for evaluation of stripping characteristics in these mixtures. The investigation describes specific road failures related to the stripping phenomena and the shortcomings of standard laboratory tests as applied to these problems. To duplicate field conditions, a dynamic preconditioning method was devised in which samples were subjected to specified numbers of load repetitions prior to testing for compressive strength to be drastically reduced by dynamic preconditioning. The creep responses were less consistent due to differences in the strain history of creep samples. Further investigations are needed to develop acceptable rheological models for describing stripping phenomena. (Author)
PB-175 954 HC$3.00 MF$0.65

13C. Construction Equipment Materials, and Supplies

ENVIRONMENT OF DEEP OCEAN TEST SITES (NOMINAL DEPTH, 6000') LATITUDE 33 Deg. 46'N, LONGITUDE 120 Deg. 37'W.
Technical note,
Naval Civil Engineering Lab., Port Hueneme, Calif.
K. O. Gray. Feb 65, 35p NCEL-TN-657

Descriptors: (*Construction materials, Environmental tests), Sea water, Oxygen, Salinity, Ocean bottom, Pacific ocean, Marine engineering.

NCEL has exposed specimens of a large number of construction materials on Submersible Test Units (STU) in 5300 and 5800 feet of water. The purpose is to determine what materials are most suitable to withstand the effects of this environment. The environmental factors considered significant are presented. The sea water at these sites is uncontaminated and 'normal' for this part of the Pacific Ocean. The particular depth at which the STUs are located places them in an environment with a relatively low dissolved oxygen concentration. In this area, the oxygen minimum zone is located at a depth between 1800 and 2800 feet with dissolved oxygen values as low as 0.20 milliliters per liter. Measurements averaging from 1.26 to 1.50 milliliters of dissolved oxygen per liter of sea water, 2.53 to 2.40 deg. C for temperature, and 34.56 to 34.59 parts per thousand for salinity were obtained from the near bottom waters at these two depths (5300 and 5800 feet). (Author)
AD-461 145 HC$3.00

A STUDY OF MULCHING PROCEDURES AS PERFORMED BY MAINE STATE HIGHWAY COMMISSION MAINTENANCE DIVISION.
Maine State Highway Commission. Materials and Research Div.
For primary bibliographic entry see Field 13B.
PB-175 758 HC$3.00 MF$0.65

METAL LATH (EXPANDED AND SHEET) AND METAL PLASTERING ACCESSORIES.
National Bureau of Standards, Washington, D. C. Office of Commodity Standards.
For primary bibliographic entry see Field 13M.
PB-175 783 HC$3.00 MF$0.65

13D. Containers and Packaging

PROTECTIVE SHIPPING PACKAGE FOR 5-INCH-DIAMETER UF 6 CYLINDER,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
K-1716 HC$3.00 MF$0.65

PACKAGING AND PRESERVATION OF SPACE-VEHICLE HARDWARE FINAL REPORT, 9 JUN. 1966 - 8 JUN. 1967.
Battelle Memorial Inst., Columbus, Ohio.
A. R. Bunk, W. E. Clark, C. W. Cooper, J. A. Gieseke, and J. M. Pilcher. 9 Jul 67, 107p NASA-CR-87419
Contract NAS8-20317

Descriptors: *Hardware, *Packaging, *Preservation, *Space vehicle, Abrasion, Coating, Control, Corrosion, Evaluation, Inspection, Laminate, Material, Specification, Testing.

For abstract, see STAR 05 20.
N67-35007 HC$3.00 MF$0.65

13E. Couplings, Fittings, Fasteners, and Joints

DEVELOPMENT OF A POSITIVE STOP-LOCKING DEVICE FOR INCORPORATION IN FLARELESS FITTINGS,
Naval Air Engineering Center Philadelphia Pa Aeronautical Materials Lab
Adolph Bold. 7 Jun 67, 18p Rept no. NAEC-AML-2621

Descriptors: (*Locking fastener devices, Pipe fittings), Seals, Performance (Engineering), Design, Rings.

A new type flareless fluid connector, in which the nut bottoms against the union face, was designed to eliminate the use of tightening torque values, reduce the vibration stress level in union, and reduce union, nut and sleeve deformations during repeated installations. (Author)
AD-657 856 HC$3.00 MF$0.65

PRESSURE SEALING CLOSURES FOR FULL PRESSURE PROTECTIVE SUIT ASSEMBLIES.
Northrop Space Labs Hawthorne Calif
For primary bibliographic entry see Field 6Q.
AD-658 204 HC$3.00 MF$0.65

SOLID PHASE ADHESION OF TUNGSTEN AND SILVER.
Syracuse Univ., N. Y.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-35066 HC$3.00 MF$0.65

MSRE CONTROL ELEMENTS MANUFACTURE, INSPECTION, DRAWINGS, AND SPECIFICATIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
ORNL-4123 HC$3.00 MF$0.65

13F. Ground Transportation Equipment

THE VALUE OF TIME FOR PASSENGER CARS: AN EXPERIMENTAL STUDY OF COMMUTERS' VALUES. VOLUME II.
Final rept. vol 2,
Stanford Research Inst., Menlo Park, Calif.
Thomas C. Thomas. May 67, 164p
Contract CPR-11-0959
See also PB-175 653

Descriptors: (*Passenger vehicles, *Value engineering), (*Traffic, Value engineering), Time, Urban areas, Statistical analysis, Questionnaires, Behavior, Roads, Measurement, Costs, Velocity, Population, Sensitivity, Attitudes, Tables.

Contents: The value of time and traffic impedances; (calculation of the value of time and traffic impedances, stability of the calculated values, com-

parison of the value of speed limit travel time and the value of impeded travel time, comparison of the value of travel time based on physical versus perceptual travel time data, use of the estimated value of travel time); Total benefits; (the method of estimating total benefits to motorists, estimates of total benefits to motorists, the effect of reduced sensitivity); Needs for future research; (estimates of the value of travel time for commuters, estimates of the value of time for all types of passenger car trips, research tasks). (Author)
PB-175 731 HC$3.00 MF$0.65

THE EFFECT OF THE 1966 TRANSIT STRIKE ON THE TRAVEL BEHAVIOR OF REGULAR TRANSIT USERS.
Barrington and Co., New York.
For primary bibliographic entry see Field 5J.
PB-175 764 HC$3.00 MF$0.65

MOTOR TRUCK FACTS.
Automobile Manufacturers Association, Detroit. 1967, 62p

Descriptors: (*Cargo vehicles, Statistical data), Commerce, Transportation, United States.

Truck and bus factory sales in 1966 of 1,731,084 units, while 1 percent below record 1965, were 12 percent above 1964. The value of factory sales set a new record of almost $4 billion. New truck registrations were 1,610,450 in 1966, 81,591 above 1965. Diesel truck output totaled 96,560 units, more than triple the number produced five years earlier. Special state and Federal taxes on motor trucks amounted to $4.1 billion during the year. Total motor trucks registered in the United States in 1966 amounted to 15,533,114--more than 700,000 above the previous year. California led in motor truck registrations with 1,638,920, followed by Texas with 1,229,814. Total bus registrations in 1966 were 323,197. Total truck and bus exports in 1966 were $360,486,000. Over 9,750,000 persons employed in the manufacture, distribution, maintenance and commercial use of motor trucks. One-fifth of all trucks are on farms. More than 90 percent of truck owners own only 1 or 2 trucks. Trucks haul 52 percent of all intercity tonnage of manufactured products except petroleum and coal products. Ninety percent of all livestock and 63 percent of fruits and vegetables are delivered to major markets by truck.
PB-175 767 HC$3.00 MF$0.65

REPORTING OF DISABLED VEHICLES BY CO-OPERATIVE MOTORISTS,
Airborne Instruments Lab., Inc., Deer Park, N.Y.
I. S. Wisepart, S. N. Rosenzweig, and M. A. Warskow. May 67, 83p AIL-5405-1
Contract CPR-11-4205
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Passenger vehicles, Motor vehicle operators), (*Motor vehicle operators, Signals), Roads, Traffic, Rural areas, Questionnaires, Monitors, Public opinion, Costs.

An experiment was conducted in four states to determine whether passing motorists will cooperate by reporting fellow motorists needing help. Highways in New York, Kansas, California, and Virginia were selected to represent a typical range of traffic volumes and trip lengths. The passing motorist was instructed by special roadside signs to report motorists needing help by flashing his headlights at a reporting station where observers recorded motorist responses. A disabled vehicle was 'staged' along the test section. The experiment has shown that motorists will cooperate and that the degree of cooperation is predictable. Because of its simplicity and low cost, such a system is particularly applicable to highways in low volume, rural areas where more sophisticated solutions would be impractical. The cooperation received throughout the experiment from highway and police officials, motorists, and news media indicates that a need exists for a reporting system and that there is a high degree of acceptance to the cooperative motorist concept. (Author)
PB-175 813 HC$3.00 MF$0.65

MECHANICAL PROPERTIES OF PNEUMATIC TIRES WITH SPECIAL REFERENCE TO MODERN AIRCRAFT TIRES.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1C.
PB-175 865 HC$3.00 MF$0.65

13G. Hydraulic and Pneumatic Equipment

PNEUMATIC TIMER FEASIBILITY STUDY FOR ARTILLERY FUZE APPLICATION.
Bowles Engineering Corp., Silver Spring, Md.
For primary bibliographic entry see Field 19A.
AD-450 413 HC$3.00

13H. Industrial Processes

NEW CONNECTOR DESIGN LOWERS COST OF MILITARY CABLE ASSEMBLY PROCESSES,
Martin Co., Orland , Fla.
For primary bibliographic entry see Field 9A.
AD-479 557 HC$3.00 MF$0.65

CLAD METALS IN CABLE CONSTRUCTION,
Metals and Controls, Inc., Attleboro, Mass.
G. H. Parker. Dec 65, 5p
Annual Wire and Cable Symposium (14th), Atlantic City, N. J., December 1965.

Descriptors: (*Metals, *Cladding), (*Electric cables, Cladding), Laminates, Shielding, Underground, Mechanical properties, Physical properties, Coaxial cables, Copper, Stainless steel, Aluminum, Steel, Bronze, Foils, Corrosion inhibition, Copper alloys, Nickel alloys.

Clad metals represent a specific area in a general field known as 'materials systems'. A materials system is defined as the integration of two or more materials to obtain a new material with a set of useful properties otherwise not available. Their increasing prominence results from the recognition that standard handbook materials often force the manufacturer to accept compromise solutions in terms of performance, reliability or cost. The 'materials system' approach, rather than starting with existing metals or alloys in a compromise solution of the use requirements, starts with a definition of the specific use requirements. This leads to the design of a layered composite material that combines the desirable features of its components in the optimum way. Some of the many approaches to materials systems are illustrated.
AD-479 571 HC$3.00 MF$0.65

METHOD OF JOINING PLASTIC SHEATHED CABLES WITH ELECTRIC HEATING WIRE,
Furukawa Electric Co., Ltd., Yokohama (Japan). Telecommunication Lab.
Hiroyoshi Ishikawa, and Katsumi Nagata. 3 Dec 65, 16p
Annual Wire and Cable Symposium (14th), Dec 1-3, 1965, Atlantic City, N. J.

Descriptors: (*Electric cables, *Joining), Plastics, Electric wire, Costs, Joints, Thermal conductivity, Shielding, Welding, Communication systems.

The paper introduces a newly developed method of jointing plastic sheathed cables by means of an electric heating wire, in particular with regard to polyethylene sheathed telephone cable. The electric heating wire joints the cable sheath to the sleeve made of the same plastic material through application of heat. The advantages are that it: is relatively economic, calls for no special skill, requires no fire, takes little time, always gives reliable results, enables branch jointing and opening and re-closing of joints, can work on portable power source. (Author)
AD-479 575 HC$3.00 MF$0.65

FIRST ANNUAL REPORT OF THE AIR FORCE MACHINABILITY DATA CENTER.
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 5B.
AD-482 278 HC$3.00 MF$0.65

FABRICATION TECHNIQUES FOR HIGH PERFORMANCE COMPOSITE MATERIALS.
Literature survey, 30 Jun 65-30 Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, J. Charles Templeton, and John D. Calfee. 31 Aug 65, 63p HPC-65-1
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Composite materials, Manufacturing methods), (*Bibliographies, Composite materials), Reinforcing materials, Glass textiles, Plastics, Filament wound construction, Laminates, Sandwich construction.

Under the classification of Fabrication Techniques for High Performance Composite Materials there have been three specific areas of interest around which the literature search has centered. These areas are (1) fabrication of composite materials, (2) fabrication of shapes using composite materials, and (3) fabrication techniques which could be applied to the manufacture of composites. The first category includes any technique or process by which a composite material is made, such as filament winding or matched die molding. The second includes fabrication techniques in which composite materials are used to make a particular shaped product, such as thermoforming of fiberglass reinforced plastic (FRP) sheets to form automobile fenders. And the third area involves fabrication techniques which are not normally used with composites but which could be adapted to composite materials fabrication. An example of this would be calendering techniques, usually employed in forming thermoplastic film, but which could be used to form FRP sheets or film. These areas have served as guides in searching the literature, and are areas in which literature on fabrication techniques has been found. (Author)
AD-488 380 HC$3.00 MF$0.65

THE USE AND FUNCTION OF COUPLING AGENTS IN GLASS-REINFORCED PLASTICS.
Literature survey, 30 Jun 65-30Apr 67,
Monsanto Research Corp., St. Louis, Mo.
Charlotte M. Bower, Michael K. Collins, and John D. Calfee. 31 Aug 65, 73p HPC-65-6
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo.

Descriptors: (*Bonding, *Composite materials), Thermoplastics, Organic solvents, Metalorganic compounds, Bibliographies, Chromium compounds, Silanes, Laminates, Glass textiles, Surface-active substances, Adsorption, Degradation, Friction, Phosphorus compounds, Reinforcing materials, Adhesion, Epoxy plastics, Amines, Copolymerization.
Identifiers: Coupling agents.

The literature, from 1950 through mid-summer 1965, of couplers and coupling mechanisms has

been searched and critically evaluated. This paper contains two sections: First, a discussion of the many theories concerning coupling action and second, a list of abstracted literature and patent references. (Author)
AD-488 385 HC$3.00 MF$0.65

A BASIC CONSTRUCTION FOR FLEXIBLE HIGH TEMPERATURE (1000F) INTERCONNECTING CABLE.
North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
For primary bibliographic entry see Field 9A.
AD-497 573 HC$3.00 MF$0.65

PENDULUM STEERING FOR THERMAL PROBES IN GLACIERS.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8L.
AD-657 581 HC$3.00 MF$0.65

DISCOUNTED PRODUCTION SCHEDULING AND EMPLOYMENT SMOOTHING.
Stanford Univ Calif Graduate School of Business
For primary bibliographic entry see Field 12B.
AD-657 624 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TOE-22 VOLTAGE CONTROLLED OSCILLATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 8p Rept no. CF-1899
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Voltage-controlled oscillators, *Quality control), Tests, Test equipment, Specifications.

The specification includes requirements for: drawings, serial numbering, visual inspection, test data, electrical test equipment, and tests.
AD-658 088 HC$3.00 MF$0.65

A METHOD FOR COATING MADDIDA MAGNETIC MEMORY DRUMS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 11C.
AD-658 092 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TNL-5 LOW PASS FILTER.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 093 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTP-20 PRESSURE ALTITUDE PICKUP,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14B.
AD-658 099 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-10A COMMUTATING SWITCH (ASCOP MODEL 4-30S-5B),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 100 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-X15 COMMUTATING SWITCH (ASCOP 2-30S-5B),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 101 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-33 COMMUTATING SWITCH (ASCOP MODEL 2-60S-5CA),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 102 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TRE-1 AND TRE-2 VOLTAGE REGULATORS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 103 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTP-19 PRESSURE ALTITUDE PICKUP,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14B.
AD-658 104 HC$3.00 MF$0.65

TTP-11 TTP-13 PRESSURE PICKUPS PERFORMANCE REQUIREMENTS AND TEST PROCEDURE,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 20 Feb 53, 13p Rept no. CF-1971

Descriptors: (*Pressure gages, *Quality control), Performance (Engineering), Test methods, Calibration, Specifications.

Specifications are given for: range adjustment, frequency stability and voltage checks, leakage tests, hysteresis and mechanical stability checks, and calibration.
AD-658 105 HC$3.00 MF$0.65

TOE-27 VOLTAGE CONTROLLED OSCILLATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 13 Mar 53, 10p Rept no. CF-1986

Descriptors: (*Voltage-controlled oscillators, Quality control), Tests, Calibration, Test equipment, Specifications.

The specification includes requirements for: serial numbering, visual inspection, test data, test equipment, calibration procedure and vibration tests.
AD-658 112 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-5A PROGRAM COMMUTATING SWITCH (ASCOP MODEL 2-30S-1/3P),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1912

Descriptors: (*Electronic commutators, *Quality control), Telemeter systems, Test methods, Tests, Test equipment, Specifications.

The specification includes requirements for: drawings; serial numbering; visual inspection; test data; electrical and physical test equipment; electrical and physical tests to be performed on each unit; electrical and physical tests, spot check; and tagging.
AD-658 116 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TSC-3B COMMUTATING SWITCH (ASCOP MODEL 2-30S-5A),
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 4p Rept no. CF-1911

Descriptors: (*Electronic commutators, *Quality control), Telemeter systems, Test methods, Tests, Test equipment, Specifications.

The specification includes requirements for: drawings; serial numbering; visual inspection; test data; electrical and physical test equipment; electrical and physical tests to be performed on each unit; electrical and physical tests, spot check; and tagging.
AD-658 117 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TQR-1A STANDARD BRIDGE ADAPTER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 119 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TPC-2A BIAS BATTERY,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 10C.
AD-658 120 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TNN-X5 DUAL RANGE INPUT VOLTAGE LIMITER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 121 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TRR-2A AND TRR-3A BRIDGE BALANCING BOARDS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14B.
AD-658 123 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE AN/DKT-5A TELEMETER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9F.
AD-658 124 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TXV-12 TRANSMITTER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9F.
AD-658 126 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE CALIBRATION CURVES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9F.
AD-658 141 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTI-1 SATURABLE REACTOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab

For primary bibliographic entry see Field 9A.
AD-658 142 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TOE-21 VOLTAGE CONTROLLED OSCILLATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9E.
AD-658 143 HC$3.00 MF$0.65

MODELING OF INTEGRATED CIRCUIT EFFECTIVENESS (MICE).
Radio Corp of America Camden N J Defense Electronic Products
For primary bibliographic entry see Field 9E.
AD-658 199 HC$3.00 MF$0.65

RELAXATION PHENOMENA IN METALS AND ALLOYS (SELECTED ARTICLES).
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11F.
AD-658 371 HC$3.00 MF$0.65

MACHINING REFRACTORY AND RARE-EARTH METALS (SECTION V),
Foreign Technology Div Wright-Patterson AFB Ohio
A. M. Danielyan, P. I. Bobrik, Ya. L. Gurevich, and I. S. Egorov. 2 May 67, 90p Rept no. FTD-MT-65-584
TT-67-62869
Edited machine transl of mono. Obrabotka Reznaniem Zharoprochnykh Stalei Splavov i Tugoplavkikh Metallov, n.p., 1965 p212-308.

Descriptors: (*Refractory metals, Machining), (*Refractory metal alloys, Machining), (*Beryllium, Machining), USSR, Tungsten, Molybdenum, Niobium, Tantalum, Niobium alloys, Tantalum alloys, Physical properties, Safety, Cutting tools.

The article deals with machining of rare earth and refractory metals. Physical-mechanical and chemical properties are discussed. Methods of machining, treatment, types of cutters, and safety procedures for various metals are described. (Author)
AD-658 385 HC$3.00 MF$0.65

SLIP CASTING OF RARE EARTH OXIDES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 18.
BNWL-437 HC$3.00 MF$0.65

BONDING OF ALUMINUM BY THE CAPACITOR DISCHARGE MAGNETIC FORMING PROCESS,
Douglas United Nuclear, Inc., Richland, Wash.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
DUN-1941 HC$3.00 MF$0.65

FLAME SPRAYING URANIUM OXIDE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
LA-3677 HC$3.00 MF$0.65

THREADING AND ASSEMBLY OF SOFT DELTA-STABILIZED PLUTONIUM PARTS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
LA-3703 HC$3.00 MF$0.65

IDENTIFYING OPTIMUM PARAMETERS OF HOT EXTRUSIONS PROGRESS REPORT, 1 MAY - 13 JUL, 1967.
Boeing Co., Seattle, Wash. Space Div.
13 Jul 67, 26p NASA-CR-87491
Contract NAS7-276

Descriptors: *Annealing, *Billet, *Hot pressing, *Magnesium oxide, Crystal, Forging, Fracture, Grain, Hardening, Hot extrusion, Porosity, Residual, Scattering, Size, Strength, Surface, Temperature, Texture.

For abstract, see STAR 05 20.
N67-34390 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF MAGNESIUM/ALUMINUM ELECTROFORMING PROCESS FOR SOLAR CONCENTRATORS FINAL REPORT, 13 MAY 1966 - 10 MAY 1967.
Electro-optical Systems, Inc., Pasadena, Calif.
R. Guidotti, M. Klein, and K. Lui. May 67, 89p
NASA-CR-66427
Contract NAS1-6218

Descriptors: *Aluminum, *Electroforming, *Magnesium, *Solar collector, Bath, Chloride, Collector, Effect, Ether, Hydride, Impurity, Lithium, Mirror, Organic, Paraboloid, Plating, Salt, Solar, Solvent.

For abstract, see STAR 05 20.
N67-34490 HC$3.00 MF$0.65

A HYDRODYNAMIC MODEL FOR COLD STRIP ROLLING.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
D. S. Bedi, and M. J. Hillier. 1967, 35p

Descriptors: *Hydrodynamics, *Lubrication, *Rolling, Arc, Coefficient, Contact, Entropy, Film, Friction, Load, Model, Pressure, Strip, Thickness, Viscous.

For abstract, see STAR 05 20.
N67-34717 HC$3.00 MF$0.65

THE DEVELOPMENT OF TEXTURE IN ZIRCONIUM ALLOY TUBES AND ITS EFFECT ON MECHANICAL PROPERTIES.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-35138 HC$3.00 MF$0.65

TIMBER RESOURCES AND INDUSTRIES IN THE ROCKY MOUNTAIN STATES.
Intermountain Forest and Range Experiment Station, Ogden, Utah.
For primary bibliographic entry see Field 2F.
PB-175 791 HC$3.00 MF$0.65

TECHNIQUES FOR THINNING PLUTONIUM FOR TRANSMISSION ELECTRON MICROSCOPY,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
RFP-899 HC$3.00 MF$0.65

TENSILE PROPERTIES OF GAMMA QUENCHED AND AGED URANIUM-RICH NIOBIUM ALLOYS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
RFP-933 HC$3.00 MF$0.65

13I. Machinery and Tools

ANALYTICAL AND EXPERIMENTAL INVESTIGATIONS INTO THE STABILITY CHARACTERISTICS OF GAS-LUBRICATED TILTING PAD JOURNAL BEARINGS,
Franklin Inst Philadelphia Pa Labs for Research and Development
John T. McCabe, and Otto Decker. Apr 67, 37p
AROD-4372:2
Contracts DA-31-124-ARO (D)-147, Nonr-2342 (00)
Presented at the Gas Bearing Symposium, Southampton Univ. (England), Dept. of Mechanical Engineering, Apr 67, Paper 17.

Descriptors: (*Gas bearings, Stability), Journal bearings, Performance (Engineering).

The gas-lubricated tilting-pad journal bearing has been successfully developed to meet the requirements imposed by ground-based and space-power machinery. Satisfactory performance in applications such as gas circulators, Brayton cycle turbo-compressors and turboalternators, and many others is a direct consequence of the well balanced analytical and experimental programs conducted both in the U.S.A. and the U.K. Experience indicates that prediction of steady-state performance only, however accurate, is insufficient to provide adequate insight into actual machine operation or to minimise hardware development problems. Dynamic performance, in terms of the interactions between rotor, bearings, and bearing-support system, must be carefully evaluated as part of the analytical procedure and the results filtered into the final design. In addition, the influence of pibot configuration, pre-load, materials, etc., must be established and carefully incorporated into each application. (Author)
AD-657 538 HC$3.00 MF$0.65

DETERMINATION OF GAS-BEARING STABILITY BY RESPONSE TO A STEP-JUMP,
Franklin Inst Research Labs Philadelphia Pa
H. G. Elrod, Jr., J. T. McCabe, and T. Y. Chu.
13 Apr 67, 9p
AROD-4372:3
Contracts DA-31-124-ARO (D)-147, Nonr-2342 (00)
Prepared in cooperation with Columbia Univ., New York. Presented at the Lubrication Symposium, Miami Beach, Fla., 4-7 Jun 67.
Availability: Published in Transactions of the ASME Journal of Lubrication Technology p1-6 1967; Paper 67-LubS-5.

Descriptors: (*Gas bearings, Stability), Determination, Journal bearings, Numerical methods and procedures.

The stability of a gas bearing is treated by a new procedure in which the bearing film is characterized by its responses to step-jump displacements. Duhamel's theorem is invoked to generalize these step responses in a system of dynamical equations. Stability is determined by calculation of a 'growth factor' for each degree of freedom. Results are presented for the infinitely long self-acting sleeve bearing and for a finite length two-bearing system. (Author)
AD-657 539 Not available from CFSTI.

INVESTIGATION OF INTERFACE FRICTION BETWEEN TOOL AND WORKPIECE MATERIALS UNDER CONDITIONS OF PLASTIC DEFORMATION.
Final rept. 1 Apr 66-31 Jul 67,
IIT Research Inst Chicago Ill Technology Center
John A. Newnham, and John A. Schey. 31 Aug 67, 92p Rept no. IITRI-B6063-6
Contract NOw-66-0503

Descriptors: (*Material forming, *Friction), Interfaces, Dies, Deformation, Metals, Adhesion, Al-

minum alloys, Titanium alloys, Steel, Vanadium alloys, Drawing (Machine processing), Extrusion, Rolling (Metallurgy), Forging, Molybdenum alloys, Zirconium alloys, Chromium alloys.

An investigation was carried out on interface friction between workpiece and die material under conditions of plastic deformation. Evaluation was made by means of two simulating tests: a twist-compression technique provided conditions of enforced sliding, whereas in ring upsetting experiments sticking friction was predominant. Hot rolling tests were performed in order to correlate the results with conventional metalworking practice. 7075 Al, Ti-6Al-4V, 4140 steel, TZM, and Hastelloy X were used as workpiece materials. These were deformed with tools of H12, 4140, WC, Al2O3-coated H12, boronized 4140, chromized 4140, and titanium carbide-coated 4140. Significant variations in friction due to die surface composition were observed, the effects being more marked with enforced interface sliding. The most promising anvil material from both frictional and mechanical aspects was boronized 4140. Good correlation with existing theories of adhesion was obtained, although these theories did not fully account for the observed effects of workpiece hardness and alloy composition. The presence of a surface oxide on the workpiece reduced the friction in elevated temperature tests with all materials except Hastelloy X, the oxide of which had no effect on friction under the conditions investigated. (Author)
AD-657 617 HC$3.00 MF$0.65

A DRIVE UNIT FOR THE TESTING OF TACHOMETER-GENERATORS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
P. A. Stickels. May 67, 13p Rept no. RAE-TR-67121

Descriptors: (*Variable speed drives, Test equipment), Great Britain, Tachometers, Accuracy, Generators, Counting methods, Amplifiers, Demodulators.

A tachometer-generator drive unit is described which is capable of providing a range of discrete speeds from 500 rev/min to 6000 rev/min. Use is made of an existing Velodyne and its associated control circuit to which an additional phase sensitive error signal is fed. The long term accuracy approaches that of the crystal oscillator which is used as a reference source. The limits within which the instantaneous velocity may vary have not been determined. (Author)
AD-657 682 HC$3.00 MF$0.65

EVALUATION OF TWO CYCLIC-STRAIN IMPACT ATTENUATORS,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Richard F. Managan, Kenneth C. Flagg, John H. Duddy, and Neville P. Clarke. May 67, 23p Rept no. AMRL-TR-66-221

Descriptors: (*Shock absorbers, Landing impact), Escape systems (Aerospace), Attenuators, Dynamics, Tests, Manned spacecraft.

Two impact energy attenuators operating on the principle of cyclic straining of materials were tested to determine: (1) maximum output accelerations and (2) resultant attenuator deflections. The attenuators were tested in tension with initial impact velocities from 914 to 1338 centimeters per second and maximum input accelerations from 21 G to 58 G. The attenuators were tested in compression with initial impact velocities from 546 to 855 centimeters per second. The maximum output acceleration showed dependency upon payload that was consistent with the attenuator design theory. (Author)
AD-657 798 HC$3.00 MF$0.65

SUMMARY OF ANALYSIS OF EFFECT OF GIMBAL COMPLIANCE ON OPERATION OF A RATE GYROSCOPE,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 17G.
AD-658 146 HC$3.00 MF$0.65

SHIPBOARD MACHINERY ANALYZER.
General Electric Co Syracuse N Y Electronics Lab
For primary bibliographic entry see Field 14B.
AD-658 156 HC$3.00 MF$0.65

THE RUN TEST CRITERIA FOR RANDOM DATA STATIONARITY.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 12A.
AD-658 223 HC$3.00 MF$0.65

THREADING AND ASSEMBLY OF SOFT DELTA-STABILIZED PLUTONIUM PARTS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
LA-3703 HC$3.00 MF$0.65

ADDITIONAL FACILITIES AVAILABLE WITH R.A.E. PROGRAM 187/ A FOR USE IN SUPPLEMENTING SPARSE OR UNEVEN DATA.
Royal Aircraft Establishment, Farnborough (England).
M. J. Trigwell. Oct 66, 19p RAE-TR-67005, AD-653693

Descriptors: *Computer program, *Data processing, *Machine tool, Accuracy, Computer, Control, Data, Format, Machine, Magnetic, Output, Processing, Program, Table, Tape, Tool.

For abstract, see STAR 05 20.
N67-34541 HC$3.00 MF$0.65

13J. Marine Engineering

THE TMB FLEXING STRESS MONITOR,
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
For primary bibliographic entry see Field 14B.
AD-281 673 HC$3.00

ENVIRONMENT OF DEEP OCEAN TEST SITES (NOMINAL DEPTH, 6000') LATITUDE 33 Deg. 46'N, LONGITUDE 120 Deg. 37'W.
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 13C.
AD-461 145 HC$3.00

TENSOR ARM MANIPULATOR DESIGN,
Scripps Institution of Oceanography San Diego Calif Marine Physical Lab
Victor C. Anderson, and Ronald C. Horn. May 67, 16p Rept no. MPL-U-18/67
Contract Nonr-2216 (05)
Availability: Published in ASME 67-DE-57 Design Engineering Conference and Show, New York, 16p May 15-18 1967.

Descriptors: (*Marine engineering, Design), Nylon, Tendons, Underwater equipment, Couplings, Costs.

A new articulated arm for underwater manipulator applications is described and several items of design considerations are discussed. The arm design is based on the use of nylon tendons for the transmission of actuator forces. Characteristics of the nylon tendon force couplings, the various combinations of components which may be used to make up a manipulator system, and a rationale for optimization of the final design are presented. (Author)
AD-657 549 Not available from CFSTI.

THE SHIP'S PROPELLER AS A VIBRATION SOURCE,
Naval Scientific and Technical Information Centre London (England)
R. Wereldsma. Feb 67, 23p Rept no. NSTIC/10872/67, NSTIC Trans-1812
TT-67-62779
Trans. of de Ingenieur (Netherlands), v78 n2 p01-012 1966.

Descriptors: (*Propellers (Marine), Vibration), (*Ships, Vibration), Marine propulsion, Hydrodynamics, Turbines, Elasticity, Great Britain, Netherlands.

The paper gives a detailed description of the mechanism, introducing fluctuating propeller shaft forces. The hydrodynamic phenomena, initiating these force fluctuations, are briefly discussed. An analysis is made of the dynamic behaviour of the propulsion system of a turbine-driven ship. The prediction of the full size fluctuating shaft forces based on model measurements and additional analyses, shows a reasonable agreement with the measured full size values. Investigations into the determination of the elasticity of the thrust block are necessary. (Author)
AD-657 595 HC$3.00 MF$0.65

SURVEY OF COMPUTER-ORIENTED METHODS IN SUBMARINE STRUCTURAL MECHANICS.
Research and development rept.,
Naval Ship Research and Development Center Washington D C Structural Mechanics Lab
Barry I. Hyman. Jun 67, 74p
NSRDC-2345

Descriptors: (*Submarines, Ship structural components), (*Ship structural components, Mechanics), Computers, Integration, Graphics, Numerical analysis, Difference equations, Reviews.

A survey was made of several computer-oriented methods in submarine structural mechanics. The topics covered are finite differences, forward integration, finite element method, and linear graph theory. An introduction to the basic concepts of these methods and an extensive survey of their applications to the analysis of submarine structures is included. (Author)
AD-657 621 HC$3.00 MF$0.65

LINEAR DAMPING CHARACTERISTICS OF OSCILLATING RECTANGULAR FLAT PLATES AND THEIR EFFECT ON A CYLINDRICAL FLOAT IN WAVES,
Stevens Inst of Tech Hoboken N J Davidson Lab
For primary bibliographic entry see Field 20D.
AD-657 636 HC$3.00 MF$0.65

GEOLOGY FROM A DEEP-DIVING SUBMERSIBLE.
Technical rept.,
Woods Hole Oceanographic Institution Mass
John Schlee. Aug 67, 7p Rept no. WHOI-Ref-67-50, WHOI-Contrib-1881
Contract Nonr-3484 (00)
Availability: Published in Geotimes v12 n4 p10-3 Apr 1967.

Descriptors: (*Oceanographic vessels, *Submarines), Ocean bottom, Drilling, Rock (Geology), Ocean bottom sampling, Design, Bahama Islands.

Two new kinds of oceanographic vessels hold great promise for geological observation of the sea

floor. These are the offshore drilling ship and the deep submersible. In combination, they offer extention of land techniques to the deep ocean through direct observation and sampling from the submersible, and coring the subsurface stratigraphy from the drilling vessel. Recently I was privileged to dive in the deep submersible Alvin (named for Allyn C. Vine of Woods Hole Oceanographic Institution) at the Tongue of the Ocean, British West Indies. Two dives were made in order to sample the rocks within the Tongue of the Ocean, to observe the physiography and depositional processes within the area, and to assess the vehicle in performing geological exploration. (Author)
AD-657 644 Not available from CFSTI.

DIGITAL CONTROL OF A NAVAL STEAM-GENERATING SYSTEM.
Research and development rept.,
Navy Electronics Lab San Diego Calif
T. Neff, and D. G. Mudd. 23 May 67, 26p Rept no. NEL-1461

Descriptors: (*Boilers, Control systems), Marine propulsion, Digital systems, Gas generating systems, Feasibility studies, Computer programs, Digital computers.

The feasibility of automatic control of conventional steam-propulsion systems using digital control techniques was studied by simulating a DLG-9 class automatic steam-generation system on both general-purpose analog and digital computers. Digital algorithms, developed to provide the control functions previously supplied by continuous controllers, successfully controlled the simulated combustion system in closed-loop fashion. (Author)
AD-657 846 HC$3.00 MF$0.65

VIBRATION TRANSMISSION STUDIES OF FLEXIBLE PIPE CONNECTIONS.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 13K.
AD-657 848 HC$3.00 MF$0.65

CAVITATION AND VENTILATION OF A RUDDER ON A TWENTY-FOOT MODEL OF A DESTROYER.
Final rept.,
Lockheed Missiles and Space Co Sunnyvale Calif
Richard Lacy. 15 Jun 67, 28p Rept no. LMSC/A846353
Contract N00014-67-C-0208

Descriptors: (*Marine rudders, *Cavitation), (*Destroyers, Marine rudders), Model tests, Ship models, Motion picture photography, Performance (Engineering).

Eighty tests of the action of a ship rudder were made using a 1/21 scale model of a destroyer. The tests were made in a variable atmosphere towing tank. Motion picture photography was used to observe ventilation and cavitation on the rudder. Some rudder force data were also obtained. These data show a progressive decrease in rudder effectiveness as cavitation number is reduced. (Author)
AD-657 948 HC$3.00 MF$0.65

FUNCTIONAL EVALUATION OF AN ELECTROLUMINESCENT DISPLAY FOR CONTROL OF A SUBMERSIBLE VEHICLE.
Interim rept. phase 2, 1 Mar 66-31 Aug 67,
North American Aviation Inc Anaheim Calif Autonetics Div
Robert H. Wright, and John S. Frost. 7 Sep 67, 44p Rept no. C7-2191/301
Contract N00014-66-C-0135

Descriptors: (*Submarines, *Control systems), Display systems, Electroluminescence, Design, Performance (Engineering), Roll, Pitch (Motion), Yaw, Tables.

An electroluminescent display for indicating position deviations and rates for a submersible vehicle in six axes of control was designed and fabricated, and performance with it was compared to performance with a conventional display panel containing comparable information. Both naive and trained subjects were used, the task being to maintain the vehicle in a hover for a 3-min. period at a reference position in the X, Y, and Z axes, and to maintain heading and level attitude. An analog computer was programmed to simulate the dynamics of a submersible vehicle, activating the selected display in response to inputs from a 6 degree-of-freedom control stick. Forcing function generators were used to provide position displacement signals, simulating deep sea currents in each translational axis. Three naive subjects were tested for 36 trials on each display. Results indicate subjects can perform a submersible hover task equally well using conventional displays or digital electroluminescent displays. Two of the naive subjects showed superior overall performance using the conventional display; the third was superior on the electroluminescent display. All three were found to be more proficient using the rotational axes of display than the translational axes on the electroluminescent display. One of the trained subjects confirmed this tendency; the other trained subject exhibited superior performance on the electroluminescent display in 5 of the 6 control axes. It was concluded that with appropriate display design, the medium of electroluminescence appears to be satisfactory for the control of this class of vehicle. (Author)
AD-657 950 HC$3.00 MF$0.65

PROPOSAL FOR THE ELECTRIC MOTOR REPAIR FACILITY IN SUBMARINE TENDERS AS-36 AND AS-37.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
R. J. Flaherty, and R. E. Gustafson. Sep 67, 34p NSRDC-2467

Descriptors: (*Electric motors, *Maintenance), (*Tenders (Vessels), Submarines), Performance (Engineering), Electric insulation, Machine tools, Instruction manuals, Measurement.

Optimum repair and overhaul of the high-precision, quiet-running motors in submarine service, to achieve satisfactory performance and reliability, require adequate technical information, tools, and facilities. It is proposed that the Electrical Repair Shop in two new submarine tenders be revised to separate the functions which generate dirt and debris from the operations which require a clean environment. Further, it is proposed that special purpose tools, precision measurement capabilities, and detailed instructions in the format of illustrated text books be added to the presently assigned equipment for the shop. (Author)
AD-658 094 HC$3.00 MF$0.65

ON THE MOTIONS OF HIGH SPEED PLANING CRAFT.
Technical rept.,
Hydronautics Inc Laurel Md
C. C. Hsu. May 67, 56p Rept no. TR-603-1
Contract Nonr-5153 (00)

Descriptors: (*Ships, Planing surfaces), (*Planing surfaces, Hydrodynamics), Boats, Motion, Dynamics, Maneuverability, Stability, Velocity.

The first part of the study presents a simple method, based on the known results of airfoil theory, of estimating the hydrodynamic characteristics of high speed planing craft. Comparisons between present calculations and experiments for flat and prismatic surfaces in steady triming, rolling and yawing attitudes are made. The calculations seem generally to be in good agreement with the data. The second part of the report discusses the turning and stability of planing craft. The governing equations, based on the kinematics and dynamics of rigid bodies are in many respects similar to those given for hydrofoil boats. Once the hydrodynamic characteristics are known the stability and turning performance of craft can be assessed with the aid of these equations. (Author)
AD-658 151 HC$3.00 MF$0.65

SHELLS OF SHIP DESIGNS,
Naval Ship Systems Command Washington D C
V. C. Chuvikovskii. Jul 67, 173p Rept no. NAVSHIPS Trans-1044
TT-67-62858
Trans. of mono. Obolochki Sudovykh Konstruktsii, Leningrad, 1966 184p.

Descriptors: (*Ships, *Structural shells), Design, Mathematical analysis, Bodies of revolution, Linear systems, Nonlinear systems, USSR.

New methods are presented for solving linear, physically and geometrically nonlinear problems of the theory of shells encountered in ship design. These methods permit one to consider many of the previously unsolved problems in structural mechanics of importance in the practice, and also make possible an appreciable refinement of a number of extant solutions. Examples are given for the design of complex shells. Trends and directions for further research are noted. (Author)
AD-658 334 HC$3.00 MF$0.65

UNSTEADY FORCE AND CAVITY CHARACTERISTICS FOR VENTILATED HYDROFOILS.
Minnesota Univ Minneapolis St Anthony Falls Hydraulic Lab
For primary bibliographic entry see Field 20D.
AD-658 341 HC$3.00 MF$0.65

A METHOD FOR CALCULATION OF HYDRODYNAMIC LIFT FOR SUBMERGED AND PLANING RECTANGULAR LIFTING SURFACES.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 20D.
PB-175 878 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERCAVITATING HYDROFOILS OPERATING NEAR THE FREE WATER SURFACE.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Virgil E. Johnson, Jr. 1961, 81p NASA-TR-R-93
N62-70517

Descriptors: (*Hydrofoils, Cavitation), Design, Drag, Camber, Aspect ratio, Thickness.
Identifiers: Supercavitating hydrofoils.

The linearized theory for infinite depth is applied to the design of two new low-drag supercavitating hydrofoils. A theory for determining the characteristics of supercavitating hydrofoils of arbitrary camber which includes the effects of depth of submersion, aspect ratio, and thickness is presented. The results of an experimental investigation of an aspect-ratio-1 flat plate and a cambered section are also presented. The theory agrees with the experimental data of the present report and with experimental data taken from other sources. (Author)
PB-175 897 HC$3.00 MF$0.65

13K. Pumps, Filters, Pipes, Fittings, Tubing, and Valves

VIBRATION TRANSMISSION STUDIES OF FLEXIBLE PIPE CONNECTIONS.

Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
Ronald C. Hirsch. Aug 67, 34p
NSRDC-2441

Descriptors: (*Pipe fittings, Vibration), (*Flexible couplings, Vibration), Wave transmission, Steel, Dacron, Submarines, Pipes, Noise.

The results of studies of vibration transmission on three sizes of pressurized and unpressurized flexible pipe connections are presented. The connections include Dacron-lined and steel-braided hoses in 'dog-leg' configurations and Electric Boat flexible pipe couplings in three-planar configurations. Results showed that, generally, the Dacron-lined hoses exhibited lower vibration transmission characteristics than did the steel-braided hoses and Electric Boat flexible couplings. However, the Dacron-lined hoses showed a larger increase in vibration transmission between 20 and 800 hertz when pressurized, than did the other types of flexible connections in the same frequency range. Results also showed that little difference existed between the magnitudes of transfer impedance for the three sizes of unpressurized Dacron-lined flexible hose. (Author)
AD-657 848 HC$3.00 MF$0.65

DEVELOPMENT OF A POSITIVE STOP-LOCKING DEVICE FOR INCORPORATION IN FLARELESS FITTINGS,
Naval Air Engineering Center Philadelphia Pa Aeronautical Materials Lab
For primary bibliographic entry see Field 13E.
AD-657 856 HC$3.00 MF$0.65

COST OF PIPELINE AND COMPRESSOR STATION CONSTRUCTION UNDER NON-BUDGET TYPE CERTIFICATE AUTHORIZATIONS AS REPORTED BY PIPELINE COMPANIES IN FISCAL YEAR 1966 (JULY 1, 1965 TO JUNE 30, 1966).
Federal Power Commission, Washington, D. C. Bureau of Natural Gas.
17 Jul 67, 34p

Descriptors: (*Pipes, Costs), Compressors, Construction, Statistical data.

The report provides a summary of the reports filed in fiscal year 1966 by individual natural gas pipeline companies of actual costs of completed construction under permanent certificates (nonbudget type) issued by the Commission in fiscal year 1965 and preceding years. Construction reports (except those under budget-type certificates) are required by section 157.20 (c) (4) of the Commission's Regulations; budget-type construction reports are required under section 157.7 (b) (c) and (d) of the regulations and have been summarized and reported separately under date of January 12, 1967. This report includes (1) actual costs of new pipelines installed and (2) actual costs of new compressor stations and additions to existing stations. Construction cost reports filed in fiscal 1966 cover work on which construction started during the past four fiscal years, 1963 through 1966. (Author)
PB-175 712 HC$3.00 MF$0.65

13L. Safety Engineering

CATALYTIC EFFECTS OF THERMOCOUPLE MATERIALS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 14B.
AD-284 880 HC$3.00

FLAMMABILITY OF SPACECRAFT WIRE IN AN OXYGEN ATMOSPHERE,
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 22B.
AD-479 568 HC$3.00 MF$0.65

EVALUATION OF TWO CYCLIC-STRAIN IMPACT ATTENUATORS,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13I.
AD-657 798 HC$3.00 MF$0.65

FULL-SCALE FIRE MODELING TEST STUDIES OF 'LIGHT WATER' AND PROTEIN TYPE FOAMS,
Naval Research Lab Washington D C
Henry B. Peterson, Edwin J. Jablonski, Raymond R. Neill, Richard L. Gipe, and Richard L. Tuve.
15 Aug 67, 65p Rept no. NRL-6573

Descriptors: (*Fire extinguishers, Effectiveness), (*Aircraft fires, Fire extinguishers), Halogenated hydrocarbons, Foams, Proteins, Surface-active substances, Aviation fuels, Fires, Model tests, Crash vehicles, Nozzles, Performance (Engineering).
Identifiers: Light Water fire extinguishing agents.

A comprehensive study was made of the fire-control and extinguishing effectiveness of 'Light Water' and protein type foams on full-scale fires of the type associated with aircraft accidents. An air aspirating nozzle and a specially designed nozzle using Refrigerant-12 as a blowing agent were interchanged and used to produce Light Water foams of different physical properties. Both the Light Water and protein foam liquid concentrates used were of the 6-percent type. The margin of superiority of Light Water over protein foam was found to be as high as 3 to 1 for control as determined by radiometer and visual measurements of avgas fires and as high as 1.5 to 1 for control of JP-5 fires. Complete fire extinguishment was achieved with application densities as low as 0.026 gal/sq ft of Light Water on JP-5 and 0.035 gal/sq ft on avgas, while protein required 0.043 gal/sq ft and 0.085 gal/sq ft respectively. The dual-agent fire-fighting concept, wherein equal quantities of Light Water and P-K-P dry chemical were discharged from a twin turret, showed no advantage over the use of Light Water foam alone in gaining control of the large-scale fires. The new 6-percent Light Water concentrate was effectively used in both the MB-5 vehicle foam-pump system and the air-aspirating type foam maker as well as with Refrigerant-12.
AD-658 318 HC$3.00 MF$0.65

QUALITATIVE ANALYSIS OF INCENDIARY MATERIALS ORIGINATING WITH TEMPERATURE AND RADIATION MEASUREMENTS.
Die Beurteilung Von Brandstoffen Aus Temperatur- Und Strahlungsmessungen
Institut Franco-allemand de Recherches, St. Louis (France).
H. W. Koch, and F. Roessler. 27 Sep 66, 18p
ISL-T-21/66
in German Supported By Ger. Defense Min.

Descriptors: *Combustion temperature, *Radiative heat transfer, *Thermal radiation, *Thermoconductivity, Combustion, Conductivity, Density, Effect, Equation, Flux, Heat transfer, Ignition, Integral, Material, Measurement, Nuclear, Radiation, Temperature, Thermal, Weapon.

For abstract, see STAR 05 20.
N67-34349 HC$3.00 MF$0.65

DETERMINATION OF TEMPERATURE DISTRIBUTION IN WOOD WITH VARIABLE SURFACE TEMPERATURE BY NUMERICAL INTEGRATION OF DUHAMEL'S INTEGRAL.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
PB-175 669 HC$3.00 MF$0.65

REPORT ON THE HIGHWAY SAFETY PROGRAM STANDARDS.
National Highway Safety Bureau, Washington, D. C.
1 Jul 67, 107p

Descriptors: (*Roads, *Safety), Standards, Law, Training, Design, Traffic, Construction, Maintenance, Control, Motor vehicle accidents.

Contents: Development of highway safety program standards; (statutory requirements, scope of the standards, outline of standard-setting process, the national highway safety advisory committee). Highway safety program standards; (driver education, driver licensing, motorcycle safety, traffic records, alcohol in relation to highway safety, periodic motor vehicle inspection, motor vehicle registration, highway design, construction, and maintenance, traffic control devices, identification and surveillance of accident locations, codes and laws, traffic courts, emergency medical services). (Author)
PB-175 726 HC$3.00 MF$0.65

TRAFFIC ACCIDENTS.
Texas Transportation Inst., College Station.
1966, 10p Bibliography-67-11
Rept. on Survey of Library Facilities Project. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle accidents, Bibliographies), Mortality rates, Roads, Traffic, Volume, Safety.

The study is a bibliography of Motor Vehicle Accidents and highway fatalities reports prepared in cooperation with the Bureau of Public Roads, Washington, D. C.
PB-175 785 HC$3.00 MF$0.65

BUILDUP INDEXES FOR INTERIOR ALASKA, 1956-1965,
Pacific Northwest Forest and Range Experiment Station, Juneau, Alaska. Inst. of Northern Forestry.
Richard J. Barney. 1967, 53p

Descriptors: (*Forestry, Fires), (*Fires, Alaska), Moisture, Weather, Periodic variations, Indexes, Tables, Protection.

With the adoption of the National Fire Danger Rating System in Alaska, the entire State now has a common method of rating forest fire danger for all protection agencies. Uniformity such as this was one of the primary reasons for the development of a national system. Compared with the 'lower 48' States, use and application of fire danger rating is relatively new to Alaska. With these broad considerations of fuel as related to fire, it appears reasonable that the buildup index can be used to rate individual fire seasons and provide assistance in other control planning activities. The paper presents summarized data for selected stations and outlines and explains various methods and procedures. (Author)
PB-175 792 HC$3.00 MF$0.65

THE RULES OF ALCOHOL, DRUGS AND ORGANIC FACTORS IN FATAL SINGLE VEHICLE ACCIDENTS.
California State Dept. of the Highway Patrol, Sacramento.
For primary bibliographic entry see Field 5K.
PB-175 942 HC$3.00 MF$0.65

13M. Structural Engineering

EXPERIMENTAL STRAIN ANALYSIS OF COMBINATION ADHESIVES/BOLT LAP JOINTS BETWEEN GLASS-REINFORCED PLASTIC LAMINATES.
Picatinny Arsenal, Dover, N. J. Feltman Research Lab.
For primary bibliographic entry see Field 11D.
AD-467 942 HC$3.00 MF$0.65

ENVIRONMENTAL CHARACTERISTICS OF TUNNELS IN SOUTH VIETNAM,
Army Engineer Waterways Experiment Station Vicksburg Miss
E. E. Addor. Aug 67, 268p Rept no. Miscellaneous Paper-4-919
ARPA Order-919

Descriptors: (*Underground structures, Vietnam), (*Climatology, Underground structures), Environment, Experimental data, Temperature, Humidity, Atmosphere, Detection, Terrain, Soil mechanics.

The purpose of the study was to gather quantitative measurements of various environmental factors in and around tunnel complexes, for guidance in establishing the suitability or the sensitivity requirements of various experimental or hypothetical sensor systems. The report consists mostly of a straightforward compilation of the collected data, with descriptions of the instruments and procedures employed, and an analysis of their failures. Except for directing attention to certain points which may be of interest to those engaged in sensor development, there is but minimal attempt here at interpretation of the data in terms of sensor requirements. The data were collected during March and early April 1967, which is about the latter part of the dry season for the area studied. The factors measured and for which data are included in this report are: (a) tunnel geometry, (b) surface composition, (c) microclimate, (d) vegetation, and (e) visual appearance and reflectivity. (Author)
AD-657 599 HC$3.00 MF$0.65

PREDICTING BLAST-INDUCED BODY MOTIONS OF A BURIED STRUCTURE WITH FOOTINGS.
Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
J. R. Allgood, and W. O. Carter. Aug 67, 63p
Rept no. NCEL-TR-539

Descriptors: (*Underground structures, Blast), Motion, Foundations (Structures), Deflection, Theory, Loading (Mechanics), Equations of motion, Predictions, Soil mechanics.

An approximate theory is presented for predicting the absolute and relative body deflections of shallow-buried shelters in order to provide the designer with a rational approach for selecting footing dimensions. The theory consists of two coupled parts, one that describes the motion of the free field and another that defines the motion of a model of the structure, its foundation, and the covering soil. The soil characteristics are represented by straight-line approximations to the loading and unloading portions of the stress-strain diagram from a one-dimensional compression test. Incremental strains are integrated as the stress wave propagates downward to obtain the absolute free-field displacement at the elevation of the footings. Motion of the structure is represented by a single-degree-of-freedom analog. Empirical functions are used to represent footing reaction and arching in the model of the structure. These functions are incorporated in the differential equation of motion, which is solved with the aid of a digital computer. The results are compared with available test data; velocities and deflections agree reasonably well but the magnitude of the peak accelerations from the theory are larger than the corresponding measurements. Computations performed with the computer code indicate that surface loads above about 100 psi cannot be resisted if the maximum relative deflection between the footing and the floor slab is limited to 2 inches. (Author)
AD-657 839 HC$3.00 MF$0.65

INTER-LAMINAR SHEAR STRESS IN SANDWICH BEAMS.
Technical rept.,
Columbia Univ New York Dept of Civil Engineering and Engineering Mechanics
R. A. Heller. Apr 67, 39p Rept no. TR-33
Contract Nonr-266 (78)

Descriptors: (*Shear stresses, *Beams (Structural)), (*Sandwich construction, Shear stresses), Deformation, Thickness, Rings, Structures, Reinforcing materials, Cantilever beams, Propellant grains, Wire, Aluminum, Rubber, Theory, Laminates.

The distribution of inter-laminar shear stress in sandwich beams is examined. It is found that in soft coned, three-ply sandwich beams elementary 'equivalent section' theory cannot be used to determine the position of maximum shear. The accuracy of the sandwich relations is experimentally illustrated on laminated beams and wire wound rings. (Author)
AD-657 857 HC$3.00 MF$0.65

LARGE DEFLECTIONS OF AN AXIALLY COMPRESSED OVAL CYLINDRICAL SHELL.
Doctoral thesis,
Polytechnic Inst of Brooklyn N Y
J. Kempner, and Y.-N. Chen. 1964, 9p
AFOSR-67-2067
Contract AF 49 (638)-1360, Grant AF-AFOSR-419-63
Availability: Published in Proceedings of the International Congress of Applied Mechanics (11th), Munich (Germany), 1964.

Descriptors: (*Structural shells, Deflection), Cylindrical bodies, Stresses, Numerical analysis, Compressive properties, Buckling (Mechanics).

In the investigation the principle of minimum potential energy is applied to the nonlinear analysis of a family of oval cylinders whose cross sections are characterized by a simplified form of an expression for the curvature proposed by Marguerre. The approximate solution is analogous to that commonly applied in energy analyses of the circular cylinder, except that the total potential energy is no longer considered as a continuous function of a circumferential wave-length parameter. The selection of the radial deflection function is based upon those functions previously considered for the circular cylinder, as well as upon the Fourier series solution employed in the classical buckling problem of the oval cylinder. (Author)
AD-657 898 Not available from CFSTI.

THE SEPARATION OF MEMBRANE AND BENDING SHEARS IN SHELLS WITH TWO BI-REFRINGENT COATINGS,
Brown Univ Providence R I Div of Engineering
For primary bibliographic entry see Field 20K.
AD-657 936 HC$3.00 MF$0.65

A REVIEW OF THE PROBLEMS OF INELASTIC LONGITUDINAL AND TRANSVERSE IMPACT LOADS ON BEAMS, WITH BIBLIOGRAPHY,
Texas Univ Austin Defense Research Lab
H. J. Plass, Jr. 4 Feb 53, 11p Rept no. DRL-324
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-1980.

Descriptors: (*Beams (Structural), *Shock waves), Rods, Impact shock, Loading (Mechanics), Bibliographies, Theory.

The article reviews theory and investigations made of inelastic longitudinal and transverse impact loads on beams.
AD-658 107 HC$3.00 MF$0.65

RESPONSE OF CIRCULAR CLAMPED PLATES TO SQUARE WAVE STRESS PULSES.
Technical rept.,
Stanford Univ Calif Dept of Materials Science
T. R. Wilshaw, and James M. Kelly. Aug 67, 48p
Rept no. SU-DMS-67-36
AROD-4800:9-MC
Contract DA-31-124-ARO (D)-251

Descriptors: (*Metal plates, *Stresses), Steel, Strain (Mechanics), Interactions, Thickness, Relaxation time, Rings, Impact shock, Rods, Loading (Mechanics).

An account is given of an experimental investigation of the response of clamped circular mild steel plates of various thicknesses subjected to rectangular stress pulses over a small circular region. The stress pulses were transmitted to the plates through a 1/2-inch diameter shock bar and the strain-time responses of the plates were measured. The stress wave interactions between the bar and the plates were measured for a number of thicknesses and the effect of the applied stress on the extent of the plastic deformation was determined. It was found that the elastic response was accurately predicted by the theory of Sneddon and the plastic response behaved according to a simple modification of this theory. The interaction between the stress pulse and plates of various thickness was theoretically predicted and found to be in excellent agreement with experimental measurements. The final plate deflections were theoretically predicted using a rigid viscoplastic theory and were in substantial agreement with the data. From this theory the data were analyzed to determine the visco-plastic constant or relaxation time of the material. (Author)
AD-658 401 HC$3.00 MF$0.65

THERMAL-SHOCK RESISTANCE FOR BUILT-UP MEMBRANES.
National Bureau of Standards, Washington, D. C. Building Research Div.
For primary bibliographic entry see Field 11C.
NBS-BSS-9 HC$0.15 MF$0.65

NON-INSTITUTIONAL HOUSING FOR THE ELDERLY,
National Swedish Inst. for Building Research, Stockholm.
For primary bibliographic entry see Field 5K.
PB-175 667 HC$3.00 MF$0.65

THE PRESENTATION OF THE SLOPE-DEFLECTION FOURIER SERIES METHOD FOR THE ANALYSIS OF CURVED ORTHOTROPIC HIGHWAY BRIDGES.
Progress rept.,
Maryland Univ., College Park. Dept. of Civil Engineering.
Conrad P. Heins, Jr. Jun 67, 81p
Prepared in cooperation with Maryland State Roads Commission, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Structural properties), Deflection, Stresses, Torque, Fourier analysis, Series, Beams (Structural), Computer programs, Mechanical properties, Differential equations, Roads, Design, Floors, Tables.

The report presents the general equations necessary for the complete analysis of a curved orthotropic or isotropic deck on curved flexible girders, using a slope-deflection technique. An example bridge problem is examined, and a resulting set of equations developed. Some numerical results, for a limiting (rectangular) condition, are obtained for the various curved plate stiffness parameters.

These results are correlated with the rectangular plate stiffnesses, giving excellent agreement. Fixed end moments and fixed end reactions for a concentrated load at various positions were also calculated for a limiting curved plate condition. Several computer programs are presented for evaluating the plate constants. (Author)
PB-175 743 HC$3.00 MF$0.65

THE ANALYSIS OF CURVED ORTHOTROPIC HIGHWAY BRIDGES BY THE FINITE DIFFERENCE TECHNIQUE,
Maryland Univ., College Park. Dept. of Civil Engineering.
Conrad P. Heins, Jr., and Charles T. G. Looney.
Jan 67, 167p
Prepared in cooperation with Maryland State Roads Commission, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Structural properties), Deflection, Stresses, Torque, Captive tests, Beams (Structural), Computer programs, Differential equations, Moments, Roads, Design, Floors.

A finite difference solution is presented for the analysis of curved orthotropic plate and curved girder bridges. The equations which determine the bridge moments, deflections and torques are written in Fortran language for the IBM 7094 and IBM 1620 computers. This method of analysis incorporates interaction of all curved girders of the floor system and the slab in evaluating actual stresses under static loads. By considering the slab to be orthotropic, the method encompasses any type of deck configuration or stiffness in a bridge design or analysis. The orthotropic plate equations are derived and the finite difference method applied for particular boundary conditions. An example is presented which illustrates the method of analysis. (Author)
PB-175 746 HC$3.00 MF$0.65

ANALYSIS OF BRIDGE DECK SLABS.
Preliminary rept. 1 Jun 66-31 Jan 67,
Kansas Univ., Lawrence. Engineering Science Div.
N. Willems, and Saad S. Mahmood. 1967, 121p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Floors), Thickness, Beams (Structural), Theory, Deflection, Structural parts, Reinforced concrete, Equations.

The report presents a theoretical analysis for single and continuous skew slabs with two opposite free edges and of constant thickness. Sample computer programs are included. The analysis is extended to cover such slabs when the two opposite edges are replaced by stiffened edge beams, as well as to slabs of variable thickness. A trigonmetric series solution is employed on the plate equations. The analysis of continuous slabs is accomplished by expressing the solution of each single slab in terms of unknown continuity moments. The continuity of slope condition is then applied to find the solution. Accuracy of the solution depends on the boundary conditions, type of loading and the number of series terms. (Author)
PB-175 747 HC$3.00 MF$0.65

A FINITE-ELEMENT METHOD OF SOLUTION FOR STRUCTURAL FRAMES.
Research rept.,
Texas Univ., Austin. Center for Highway Research.
Hudson Matlock, and Berry Ray Grubbs. May 67, 105p RR-56-3
Rept. on Development of Methods for Computer Stimulation of Beam-Columns and Grid-Beam and Slab Systems. Prepared in cooperation with Texas Highway Dept., and Bureau of Public Roads, Washington, D. C. See also PB-173 727.

Descriptors: (*Beams (Structural), Numerical methods and procedures), Structures, Structural properties, Difference equations, Structural parts, Computer programs, Supports, Loading (Mechanics).

An efficient numerical method of solution to structural frame problems is presented. The method is shown to be applicable to no-sway, plane-frame structures that may derive part or all of their support from soils. A finite-element model composed of bars and springs is used to represent groups of orthogonal frame members. Finite-difference equations written for this model are solved by a previously developed recursive method. Individual beams are solved alternately in the two orthogonal directions and at each joint a relaxation technique is used to adjust the two solutions and achieve rotational compatibility. A complete listing of the FORTRAN computer program is included, plus several example problems illustrating the applicability of the method. (Author)
PB-175 748 HC$3.00 MF$0.65

A FINITE-ELEMENT METHOD FOR BENDING ANALYSIS OF LAYERED STRUCTURAL SYSTEMS.
Research rept.,
Texas Univ., Austin. Center for Highways Research.
Wayne B. Ingram, and Hudson Matlock. Jun 67, 239p RR-56-5
Rept. on Development of Methods for Computer Simulation of Beam-Columns and Grid-Beam and Slab Systems. Prepared in cooperation with Texas Highway Dept., and Bureau of Public Roads, Washington, D. C. See also PB-173 727.

Descriptors: (*Beams (Structural), Bending), (*Bending, Numerical methods and procedures), Structural properties, Structures, Structural parts, Computer programs, Equations, Supports, Panels (Structural), Loading (Mechanics).

An efficient numerical method of bending analysis for simply connected grid-beam and orthotropic plate-beam layered structural systems is presented. The method relies upon the availability of a high-speed digital computer. The real structure is replaced by a finite-element model of bars and springs. The equations for the two types of systems considered are derived directly from the model to circumvent conventional assumptions of continuity. The model elements are further grouped into individual beams or line members for the three-phase iteration process. An alternating-direction relaxation technique is employed to coordinate the solution of the individual beams. This technique uses certain closure parameters for convergence of sulution which should be based upon the properties of the opposing beams. Eight example problems demonstrate the applicability of the method to various problems, including variable and discontinuous transverse and axial loads, bending stiffness, angular restraints, and support conditions. (Author)
PB-175 749 HC$3.00 MF$0.65

A COMPARATIVE STUDY OF ELASTOMERIC MATERIALS FOR BRIDGE BEARING PADS,
Oklahoma Univ. Research Inst., Norman.
J. J. Sestak, Jr., W. W. Aldridge, and F. K. Fears.
Mar 67, 123p Rept. no. 0745
Prepared in cooperation with Oklahoma State Highway Dept., and Dept. of Transportation, Washington, D. C., Federal Highway Administration, Washington, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Elastomers), Bearings, Structural parts, Deformation, Concrete, Deflection, Creep, Shear stresses, Captive tests, Design, Compressive properties, Laminates, Steel, Materials, Tests.

Elastomeric bearing pads of five different materials with shape factors ranging from one to six were subjected to a series of three specific tests to determine and compare their respective load-deformation characteristics. Compression-deflection tests were conducted to determine short time load-deflection responses for solid pads and laminated pads placed between bearing surfaces of concrete-and-concrete, concrete-and-steel, and steel-and-steel. Additional vertical deflections due to creep in the pad material subjected to a constant static compressive stress were measured over periods ranging from one to three weeks. Investigations were made to determine the effects of repetitive reversed horizontal shear forces acting on a bearing pad while loaded under a constant vertical compressive stress. An objective comparison was made of the materials tested. Recommendations for a design procedure using curves from the experimental data are outlined. Recommendations are made for future research. (Author)
PB-175 755 HC$3.00 MF$0.65

STEEL SPIRALS FOR REINFORCED CONCRETE COLUMNS.
Simplified practice recommendation.
National Bureau of Standards, Washington, D. C. Office of Commodity Standards.
1 Oct 63, 10p R53-63

Descriptors: (*Standards, Reinforcing materials), (*Reinforcing materials, Steel), Beams (Structural), Rods, Wire, Specifications, Materials, Tables.

The purpose of this recommendation is to establish as a standard of practice in production, distribution, and use the sizes of steel spirals used for concrete column reinforcement in the building industry. The standard establishes three standard sizes of steel bars and wire used for spirals, and includes a table listing the recommended pitches in multiples of 1/4 inch for spirals with core diameters from 11 to 39 inches inclusive for varying percentages of spiral reinforcement. Definitions of several terms applicable to steel spirals are also included. (Author)
PB-175 782 HC$3.00 MF$0.65

METAL LATH (EXPANDED AND SHEET) AND METAL PLASTERING ACCESSORIES.
Simplified practice recommendation.
National Bureau of Standards, Washington, D. C. Office of Commodity Standards.
Apr 61, 8p R3-60

Descriptors: (*Structural parts, Coatings), Construction materials, Metals, Sheets, Weight, Standards, Packaging, Identification.
Identifiers: Lath.

The purpose of this recommendation is to establish the varieties, weights, and sizes of metal lath and accessories considered adequate for interior plastering. The recommendation covers several types and kinds of expanded metal lath as given in tables 1 to 4, and sheet lath as described in the section following table 4. It also covers metal plastering accessories and their packaging, as given in tables 5 to 14, and a schedule covering the unitizing of metal lath, table 15.
PB-175 783 HC$3.00 MF$0.65

BRIDGE DECKS.
Texas Transportation Inst., College Station.
1966, 11p Bibliography-67-10
Rept. on Survey of Library Facilities Project. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, Bibliographies), (*Floors, Bridges), Surface properties, Glass textiles, Structural properties, Indexes.

The research is a bibliography on bridge decks, materials used, design, and structural analysis.
PB-175 784 HC$3.00 MF$0.65

EFFECT OF A STRINGER ON THE STRESS CONCENTRATION DUE TO A CRACK IN A THIN SHEET.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. Lyell Sanders, Jr. 23 Dec 57, 13p NASA-TR-R-13

Descriptors: (*Reinforcing materials, Sheets), (*Sheets, Stresses), Cracks, Boundary value problems, Differential equations.

A coefficient is obtained for determining the effect of a reinforcing stringer on the stress concentration factor at the tip of a crack in a thin sheet. The results are given for the case in which the stringer is intact and for the case in which the stringer is broken. In the first case the stress concentration factor for the stringer is also given. (Author)
PB-175 832 HC$3.00 MF$0.65

AN IMPROVED FIRST-APPROXIMATION THEORY FOR THIN SHELLS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. Lyell Sanders, Jr. 4 Feb 59, 14p NASA-TR-R-24
AD-219 887

Descriptors: (*Structural shells, Theory), Approximation (Mathematics), Strain (Mechanics), Stresses, Boundary value problems.

A theory is derived in which all strains vanish for any rigid-body motion in contrast to the results of Love's theory. Expressions for the stress resultants and couples which satisfy the homogeneous equilibrium equations are given in terms of three stress functions. The special forms of the equations of the new theory in the case of a circular cylinder are given in an appendix. (Author)
PB-175 839 HC$3.00 MF$0.65

LOCAL INSTABILITY OF THE ELEMENTS OF A TRUSS-CORE SANDWICH PLATE.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Melvin S. Anderson. 10 Apr 58, 16p NASA-TR-R-30

Descriptors: (*Sandwich panels, Stability), Buckling (Mechanics), Graphics, Loading (Mechanics), Stresses, Structural properties.

The charts presented give the compressive buckling coefficients for a single-truss-core and a double-truss-core sandwich plate. These charts cover a wide range of sandwich proportions and may be used for sandwiches with unequal faces. They apply to in-plane compressive loads acting parallel or perpendicular to the core direction or for various combinations of these loads. (Author)
PB-175 844 HC$3.00 MF$0.65

THE PHENOMENON OF CHANGE IN BUCKLE PATTERN IN ELASTIC STRUCTURES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Manuel Stein. 30 Jan 59, 12p NASA-TR-R-39
AD-227 006, N62-70463

Descriptors: (*Panels (Structural), Buckling (Mechanics)), (*Elastic shells, Buckling (Mechanics)), (*Buckling (Mechanics), Structures), Loading (Mechanics), Metal plates, Beams (Structural), Structural properties.

A model is analyzed which exhibits the important properties associated with change in buckle pattern of plates. The analysis includes a rigorous study of stability in its various modes. A discussion of how the present results may be applied to plates and other elastic structures is given. (Author)
PB-175 912 HC$3.00 MF$0.65

LOADS AND DEFORMATIONS OF BUCKLED RECTANGULAR PLATES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Manuel Stein. 5 Mar 59, 30p NASA-TR-R-40
AD-227 005, N62-70464

Descriptors: (*Metal plates, Buckling (Mechanics)), Rectangular bodies, Loading (Mechanics), Deformation, Panels (Structural), Equations, Stresses.

The nonlinear large-deflection equations of von Karman for plates are converted into a set of linear equations by expanding the displacements into a power series in terms of an arbitrary parameter. The postbuckling behavior of simply supported rectangular plates subjected to longitudinal compression and subject to a uniform temperature rise is investigated in detail by solving the first few of the equations. Experimental data are presented for the compression problem. Comparisons are made for total shortening and local strains and deflections which indicate good agreement between experimental and theoretical results. (Author)
PB-175 913 HC$3.00 MF$0.65

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14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

A PERSONNEL COST DATA BANK FOR USE IN STUDIES OF COST AND EFFECTIVENESS.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5A.
AD-657 941 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE ECONOMIC VALUE OF AIR TRAFFIC CONTROL IMPROVEMENTS AND APPLICATION TO ALL-WEATHER LANDING SYSTEMS, VOLUME I.
United Research Inc Cambridge Mass
For primary bibliographic entry see Field 17G.
AD-658 214 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE ECONOMIC VALUE OF AIR TRAFFIC CONTROL IMPROVEMENTS AND APPLICATION TO ALL-WEATHER LANDING SYSTEMS, VOLUME II.
United Research Inc Cambridge Mass
For primary bibliographic entry see Field 17G.
AD-658 215 HC$3.00 MF$0.65

14B. Laboratories, Test Facilities, and Test Equipment

THE TMB FLEXING STRESS MONITOR,
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
Sheng-Lun Chuang. Feb 62, 33p
DTMB-1560

Descriptors: (*Monitors, Stresses), (*Ship hulls, Stresses), Marine engineering, Recording systems, Strain gages, Bending, Ship structural components, Effectiveness, Measurement, Deformation.

A flexing Stress Monitor has been developed to measure the strains and to compute, record, and display the associated stresses experienced by a ship at sea. The data are displayed by monitor lights, and by meters to aid the captain in ship handling. The continuous records are suitable for statistical analysis at a later date to provide general information of use in ship design. The monitor requires only standard 115-volt 60-cps electrical power, and is intended for continuous operation for weeks aboard ship with a minimum of care. Analysis of the records from tests in the laboratory and at sea have shown that the prototype monitor performed well as an automatic data recorder. The usefulness of the stress monitor concept for ship operations remains to be evaluated. A method of establishing peak-to-peak and rms stress levels for the monitor lights is suggested. (Author)
AD-281 673 HC$3.00

CATALYTIC EFFECTS OF THERMOCOUPLE MATERIALS.
Technical documentary rept.,
National Bureau of Standards, Washington, D. C.
Lief O. Olsen. Jun 62, 49p
ASD-TDR-62-304
AF 33 (616)-61-01

Descriptors: (*Thermocouples, Hazards), (*Explosive gases, Catalysis), (*Combustion, *Catalysis), Platinum, Palladium, Iridium, Platinum alloys, Iridium alloys, Catalysts, Hydrogen, Carbon monoxide, Propanes, Ignition.

Wires of platinum, palladium, iridium, platinum plus 15% iridium, and the two elements of the Platinel thermocouple were found to catalyze the combustion of mixtures of hydrogen, carbon monoxide, and propane in air. Combustion of methane-air mixtures was not initiated by these materials at temperatures up to 1800F. Experiments with gold, silver, Chrome l, Alume l, and constantan wires showed no catalysis of any mixture at temperatures of the wires up to 1800F. Base-metal thermocouples are therefore recommended for accurate determinations of temperatures of gaseous mixtures containing combustible materials. (Author)
AD-284 880 HC$3.00

FEEDBACK-STABILIZED LIGHT CHOPPER WITH CONTINUOUSLY VARIABLE FREQUENCY.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 20F.
AD-657 536 Not available from CFSTI.

OPTICAL METHOD FOR ANALYSIS OF ATMOSPHERIC EFFECTS ON LASER BEAMS.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 20E.
AD-657 559 HC$3.00 MF$0.65

A PHYSICAL COMPARATOR FOR THE COLOR TEMPERATURES OF INCANDESCENT LAMPS.
Johns Hopkins Univ Baltimore Md Engineering Lab
For primary bibliographic entry see Field 9E.
AD-657 618 HC$3.00 MF$0.65

A WIDE RANGE ELECTRONIC CHRONOSCOPE.
Technical rept.,
Johns Hopkins Univ Baltimore Md Engineering Lab
R. G. Roush. 1 Dec 50, 24p
SPECDEVCEN-166-1-120
Contract N5ori-166 (01)

Descriptors: (*Electronic equipment, Design), Test methods, Calibration, Test equipment (Electronics), Velocity, Friction, Oscillographs, Circuits, Voltage, Time.

The purpose of this paper is to describe a wide range non-counter type electronic chronoscope which indicates quickly and accurately the duration of single or repetitive pulses lying in the range of from ten microseconds to one minute. (Author)
AD-657 620 HC$3.00 MF$0.65

A DRIVE UNIT FOR THE TESTING OF TACHOMETER-GENERATORS.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 13I.
AD-657 682 HC$3.00 MF$0.65

RESEARCH ON ADVANCED GASDYNAMICS TEST FACILITIES.
Final rept.,
Cornell Aeronautical Lab Inc Buffalo N Y
J. W. Daiber, F. J. Stoddard, H. M. Thompson, and R. G. Rehm. Apr 67, 129p Rept no. CAL-AD-1716-A-9
ARL-67-0069
Contract AF 33 (657)-8860

Descriptors: (*Aerodynamics, *Test facilities), (*Shock tubes, *Lasers), Enthalpy, Performance (Engineering), Dissociation, Hypersonic characteristics, Plasma physics, Heating.

The report describes studies carried out on methods of improving the performance of conventional shock tubes and shock tunnels, on problems peculiar to high enthalpy test facilities, and on the application of lasers to aerodynamic facilities. A number of the studies carried out have previously been described in detail in separate reports or papers and these are summarized; those previously unreported, in particular the laser application studies and recent isentropic compression tube studies, are described in detail. (Author)
AD-657 775 HC$3.00 MF$0.65

TECHNICAL PUBLICATIONS AND PRESENTATIONS, 1966.
Aerospace Research Labs Wright-Patterson AFB Ohio
1966, 40p Rept no. ARL-MR-67-0008

Descriptors: (*Air force research, Bibliographies), Chemistry, Fluid mechanics, Plasma physics, Thermodynamics, Solid state physics, Metallurgy, Ceramic materials, Physics, Reports.

The publication lists the technical reports, technical articles, papers presented, books/chapters of books, OAR research review articles, lectures and seminars (ARL speakers), guest speakers, and technical briefings, authored or co-authored by scientists of the Aerospace Research Laboratories, and published, presented or prepared in calendar year 1966. In addition, this edition includes a record of the Air Force Institute of Technology graduate student theses completed during the year under sponsorship of ARL. This publication is divided into eleven sections: Directorate of Plans and Analysis, Energetic Research, Chemistry Research, Fluid Dynamics Facilities, Plasma Physics Research, Applied Mathematics Research, Thermo-Mechanics Research, General Physics Research, Hypersonic Research, Solid State Physics Research and Metallurgy and Ceramics Research. (Author)
AD-657 879 HC$3.00 MF$0.65

BOLOMETRIC DETECTION OF COHERENT 9-GHz LONGITUDINAL PHONONS IN X-CUT QUARTZ.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20B.
AD-657 912 Not available from CFSTI.

DESIGN FOR MAINTENANCE OF THE SYSTEM BANDWIDTH IN THE PRESENCE OF PARAMETER CHANGES,
Frank J Seiler Research Lab United States Air Force Academy Colo
Bernard S. Morgan, Jr. Mar 67, 8p Rept no. SRL-67-0007

Descriptors: (*Bandwidth, *Control systems), Feedback, Design, Maintenance, Statistical analysis, Polynomials.

A design procedure for maintaining a system's bandwidth essentially constant in the presence of parameter variations is presented. The procedure is applicable to a single input-output plant. The plant is compensated by integral control and then state variable feedback. The use of the integral control requires that a procedure for specifying the closed loop poles of a system by state variable feedback be modified. This modification and the use of sensitivity functions which relate how the closed loop poles vary with incremental changes in the plant parameters form the basis for the design procedure. The result is a systematic procedure which permits the selection of the closed loop poles so that these poles essentially track the zeros as the parameters change. An illustrative example is used to demonstrate the application of the design procedure. (Author)
AD-658 022 HC$3.00 MF$0.65

AN EXPERIMENTAL APPARATUS FOR THE MEASUREMENT OF SESSILE DROP CONTACT ANGLES AT ELEVATED TEMPERATURES.
Technical rept. Jan-Dec 66,
Air Force Materials Lab Wright-Patterson AFB Ohio
W. L. Clow, and Tung Liu. Jun 67, 21p Rept no. AFML-TR-67-152

Descriptors: (*Drops, *Test equipment), (*Lubricants, Test equipment), Ceramic materials, Sodium compounds, Borates, Surface properties, Laboratory equipment.

An equipment suitable for the measurement of the contact angles of molten sessile drops on solid substrate was developed. Temperatures up to 2250F may be readily controlled to within plus or minus 10F for long periods of time. The environment of the specimens may be either vacuum (to 0.00001 Torr) or a specific gas. Photographic techniques were used to record the contact angles. Experimental results of molten Na2B4O7 on metal substrates showed a standard deviation of less than 2 deg. The uncertainly introduced by the angle measurement process was shown not to exceed +2 or -2 deg. (Author)
AD-658 023 HC$3.00 MF$0.65

USE OF THE ELLIPSOMETER IN THE MEASUREMENT OF THIN FILMS.
Technical rept. Jul 65-Oct 66,
Army Weapons Command Rock Island Ill Research and Engineering Div
Bernard J. Bornong. Jul 67, 37p
RIA-67-1859

Descriptors: (*Films, Measurement), (*Laboratory equipment, Acceptability), (*Corrosion, Test methods), Corrosion inhibition, Antioxidants, Cleaning compounds, Stearates, Stearic acids, Monomolecular films, Chromium, Steel, Refractive index, Polarization, Adsorption, Thickness.
Identifiers: Ellipsometry.

Work was performed to outline procedures for use of the ellipsometer in thin film measurement for basic studies on corrosion and corrosion inhibition. The Poincare sphere was used as a geometrical model to analyze ellipsometer readings in terms of polarization forms of light. Changes in polarization form were used to obtain thickness and refractive index of thin films of adsorbed inhibitors or corrosion products. A five-layer barium stearate film and adsorbed monolayers of stearic acid on chrome were measured. Conclusions are that procedures outlined in the report give results consistent with published results. Ellipsometry measures films with thickness of the order of molecular dimensions. Film growth in adsorption and corrosion processes can be observed beginning in their earliest stages.
AD-658 063 HC$3.00 MF$0.65

SIMPLIFIED SWITCHING FUNCTIONS FOR TIME-OPTIMAL CONTROL SYSTEMS,
Illinois Univ Urbana Coordinated Science Lab
Harry Schmeichel. Aug 67, 42p Rept no. R-365
Contract DA-28-043-AMC-00073 (E)

Descriptors: (*Control systems, Optimization), (*Special functions (Mathematical), Switching circuits), Sensitivity, Theses, Mathematical analysis, Response.
Identifiers: Switching functions.

A method is given to derive simplified switching functions for the design of third or higher order, time-optimal control systems. The type of system, that is considered, is characterized by small parameters which increase the order of the system. The sensitivity functions with respect to these small parameters has been the main tool of analysis. Two existing methods have been used to determine special initial conditions for the sensitivity equations because these equations are discontinuous at $t = 0$. It is shown that the same methods can be applied to deal with the discontinuity of the sensitivity functions at the switching time by a transformation of the original system. This investigation above all demonstrates how sensitivity functions with respect to small parameters, that change the system order, can be used to greatly simplify the analysis of higher order systems.
AD-658 073 HC$3.00 MF$0.65

IMPROVED INSTRUMENTAL METHODS FOR RAPID ANALYSIS OF STAINLESS AND MARAGING STEELS.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
W. D. McHenry, and O. J. Littig. Jun 67, 20p
RIA-67-1593

Descriptors: (*Maraging steels, Spectroscopy), (*Stainless steel, Spectroscopy), Spectrometers, Calibration, Chemical analysis, X-ray spectroscopy.

Six random samples of maraging steel were analyzed for manganese, chromium, molybdenum, nickel, copper, titanium, aluminum and cobalt for use as secondary standards for instrumental analysis. Analyses were made for these elements in solution by both optical and X-ray emission techniques as well as by the usual wet chemical methods. The range of the elements in the six samples was adequate except for nickel. By the use of these standards and thers previously available, a direct reading optical emission spectrometer was calibrated for both maraging and stainless steels. (Author)
AD-658 074 HC$3.00 MF$0.65

WIND TUNNEL DATA ANALYSIS REPORT ON OAL 259, STATIC PROBE TESTS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
E. A. Bonney. 7 May 53, 55p Rept no. CF-2021

Descriptors: (*Pressure gages, Tests), Wind tunnels, Angle of attack, Mach number.

Wind tunnel tests were made using various designs of pressure probes mounted ahead of three different nose designs. These probes included the measurement of static pressure, ram pressure, and angle of attack and yaw in various combinations with

each other in an angle of attack range up to 23 degrees. In addition, studies were made of the effect of hole size on the static pressure reading, effect of high angle of attack on these readings, the effect of flow out of the static holes, and the effect of the proximity of a shock wave, and the use of a unique slotted type probe design to minimize variations of static pressure reading with roll angle. It was found that, as the hole sizes were increased from .040 to .125 inches, the static pressure decreased very slightly so as to cause the indicated Mach number (when calculated from measured ram and static pressure) to vary from 1.77 to 1.79 (tunnel M = 1.73) at zero angle of attack. This discrepancy disappears at 6 degrees angle of attack at zero roll angle. A Mach number variation of less than .01 exists up to 5 to 6 degrees angle of attack with the NACA type probe (S). With the hemispherical type probe the indicated Mach number increases with angle of attack at a rate of approximately .01 for every 5 degrees angle of attack up to an angle of 8 degrees, after which it rises slightly more rapidly. (Author)
AD-658 090 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTP-20 PRESSURE ALTITUDE PICKUP,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 6p Rept no. CF-1910
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Pressure gages, *Quality control), Altimeters, Tests, Performance (Engineering), Specifications, Calibration, Test methods.

The specification includes requirements for: construction, serial numbering, inspection, test data, test equipment, set-ups and range adjustments, tests, aging, calibration and tagging.
AD-658 099 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TTP-19 PRESSURE ALTITUDE PICKUP,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 6p Rept no. CF-1909
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif. Pacific Division Development Labs.

Descriptors: (*Pressure gages, *Quality control), Altimeters, Tests, Performance (Engineering), Specifications, Aging (Materials), Calibration, Test methods.

The specification includes requirements for: construction, serial numbering, inspection, test data required, test equipment, set-ups and range adjustments, tests, aging, calibration, and tagging.
AD-658 104 HC$3.00 MF$0.65

TTP-11 TTP-13 PRESSURE PICKUPS PERFORMANCE REQUIREMENTS AND TEST PROCEDURE,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13H.
AD-658 105 HC$3.00 MF$0.65

A METHOD OF MONITORING SAMPLED FUNCTIONS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. A. Craig. 24 Nov 52, 4p Rept no. CF-1918

Descriptors: (*Functions, Monitors), (*Measuring devices (Electrical + electronic), Functions), Sampling, Oscilloscopes, Signals, Display systems.

The monitoring of two specific functions out of a series of twelve sampled functions was accomplished by using a 304H Dumont Scope on the output of the discriminator containing these functions. The sync monitoring pulse is derived from the battery sample, which is the voltage sample with the greatest negative amplitude in the commutated sequence. By use of the grid scale on the face of the oscilloscope and by adjustment of the 'Y' and 'X' amplifier gain controls, a visual scale is provided which gives a proportioned percentage change of the commutated sample under observation. (Author)
AD-658 115 HC$3.00 MF$0.65

ANTENNA TESTING RANGE AND FACILITIES,
New Mexico State Univ University Park Physical Science Lab
Herbert Haas. 2 Apr 54, 25p
Contract NOrd-9939
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2110.

Descriptors: (*Radio ranges, *Antennas), (*Test facilities, Antennas), New Mexico, Antenna radiation patterns, Measurement, Test equipment.

The report presents a composite picture of the Laboratory facilities available for antenna design, development, and testing. Photographs of the antenna range are included to illustrate the topography and the arrangement of components.
AD-658 118 HC$3.00 MF$0.65

PERFORMANCE REQUIREMENTS AND TEST PROCEDURE TRR-2A AND TRR-3A BRIDGE BALANCING BOARDS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. J. Mayo-Wells. 30 Oct 52, 3p Rept no. CF-1907
Prepared in cooperation with Bendix Aviation Corp., Burbank, Calif., Pacific Div. Development Labs.

Descriptors: (*Electric bridges, *Quality control), Performance (Engineering), Test methods, Specifications, Airborne, Tests.

The specification includes requirements for construction, visual inspection, test equipment, tests, and tagging.
AD-658 123 HC$3.00 MF$0.65

A LOW FREQUENCY SPECTRUM AND AMPLITUDE DISTRIBUTION ANALYZER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
D. B. Staake. 15 Mar 54, 47p Rept no. CF-2154

Descriptors: (*Spectrum analyzers, Low frequency), Magnetic tape, Amplifiers, Detectors, Integrators, Circuits, Recording systems, Tests.

In the analysis of time varying signals, two of the important characteristics are the frequency spectrum and the amplitude distribution. The need for equipment to plot these curves automatically from data recorded in the field led to the development of the equipment described in this report. Most of the data to be analyzed were recorded on magnetic tape so that it might be preserved for analysis at a later date. The frequencies of interest in these data were in the region below a few cycles per second. The magnetic tape techniques are well suited for this job because of the frequency multiplication possible by speeding up the playback of the tape. The equipment, as it is now used, operates over the frequency range of about 0.04 to 5 cycles per second. The data recorded on the tape must of sufficient length to give the required accuracy. A given data sample is formed into a closed loop of tape in order to give a repeating function for analysis. The outputs of the system are recorded on a six-channel Brush recorder. Duplicate circuitry is provided so that two signals recorded simultaneously on the same tape can be analyzed (both spectra and amplitude distribution) at the same time. Thus, there are four outputs on the Brush recorder: two spectra and two amplitude distribution curves. (Author)
AD-658 125 HC$3.00 MF$0.65

A SIMPLE FLYING SPOT SCANNER AS A RADAR VIDEO GENERATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 17I.
AD-658 128 HC$3.00 MF$0.65

ACCURATE DETERMINATION OF THE MOMENT OF INERTIA AND CENTER OF GRAVITY POSITION OF WIND TUNNEL MODELS.
Master's thesis,
Texas Univ Austin Defense Research Lab
E. A. Ripperger. 1 Jul 53, 71p Rept no. DRL-330
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2012.

Descriptors: (*Wind tunnel models, *Guided missile models), Moment of inertia, Center of gravity, Measurement, Accuracy.

Selected experimental methods are analyzed to determine the accuracy required in the measurement of subsidiary quantities and the optimum magnitudes for those quantities in determining center of gravity locations and moments of inertia for wind tunnel models. The conclusions to which the analyses lead are tested by experimentally determining the moments of inertia and center of gravity positions of four missile models and a rectangular parallelepiped. It is shown that these parameters can be determined with an accuracy of 0.1 percent or better using ordinary laboratory equipment if the measurements are carefully made using optimum values of the various quantities involved. (Author)
AD-658 155 HC$3.00 MF$0.65

SHIPBOARD MACHINERY ANALYZER.
Final rept.,
General Electric Co Syracuse N Y Electronics Lab
F. H. Schlereth, and C. F. Fancett, Jr. Aug 67, 68p
Contract N00014-66-C-0175

Descriptors: (*Bearings, *Non-destructive testing), (*Spectrum analyzers, Non-destructive testing), Shipborne, Machines, Magnetic recording systems, Magnetic tape, Detection, Data processing systems, Noise, Damage.

The general purpose of this program was to assess the feasibility of detecting particular types of rolling element bearing damage by utilizing a data processing technique, frequency of binary word occurrence (FOBW) developed by the General Electric Company. The results show that using a particular type of preprocessing involving envelope detection followed by low pass filtering, it is feasible to detect significant signals which appear to be related to damage to the inner ring or to the ball. Furthermore, it is shown that it is possible to find statistically significant trends in the frequency of occurrence of binary words selected by means of computer search. These trends exist prior to the time at which significant signals appear. (Author)
AD-658 156 HC$3.00 MF$0.65

ULTRA LOW-SPEED ANEMOMETRY,
Colorado State Univ Fort Collins Fluid Dynamics and Diffusion Lab
Robin J. Kung, and G. J. Binder. Jun 67, 130p

Rept no. CER66-67RJK49
Grant DA-AMC-28-043-65-G20

Descriptors: (*Anemometers, *Wind tunnels), Design, Velocity, Performance (Engineering), Temperature sensitive elements, Calibration, Drag.

An investigation of low-speed (0-2 ft/sec) anemometers is presented. First the design, the characteristics and the calibration of a very low-speed micro wind tunnel are described. Then the principle, operation and performance of three different anemometers at these low speeds are discussed. These instruments are: (1) hot-spot anemometer, based on the measurement of the traveling time of a hot cloud, (2) drag anemometer which consists of a small plate mounted to the moving coil mechanism of a micro-ammeter, (3) constant temperature hot-wire anemometer. The comparison of the merits and disadvantages of these instruments shows that in most instances the hot-wire anemometer is superior to the two other anemometers. (Author)
AD-658 172 HC$3.00 MF$0.65

MONTANA LASA LIGHTNING ACTIVITY FOR 1966,
Philco-Ford Corp Billings Mont Education and Technical Services Div
B. L. Ramsey. 22 May 67, 43p

Descriptors: (*Electronic equipment, Damage), (*Lightning, Electronic equipment), Circuits, Protection, Thunderstorms, Installation, Tables.
Identifiers: LASA.

The report covers lightning activity within the Montana LASA during 1966 with excerpts from 1965 reports when applicable. Included are observations of lightning activity, damage to LASA equipment, a description of present lightning protection circuitry and discussions of the lightning counter experiment and subarray B4 Carbon Block check conducted during the year. Lightning season as used in this report refers to the period of 1 Jun through 30 September. A summary comparison of 1965 vs. 1966 figures in several categories is shown in Table 1. The method used to obtain the 1966 figures is explained in each category. (Author)
AD-658 177 HC$3.00 MF$0.65

EVALUATION REPORT OF MANDREL INDUSTRIES MODEL EV-21V VERTICAL SEISMOMETER, SERIAL NO. 101 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 178 HC$3.00 MF$0.65

EVALUATION REPORT OF TELEDYNE MODEL TD-202 TRI-AXIAL SEISMOMETER, SERIAL NO. P-1 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 179 HC$3.00 MF$0.65

EVALUATION REPORT OF GEOTECH MODEL 20171A VERTICAL SEISMOMETER, SERIAL NO. 706 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 181 HC$3.00 MF$0.65

SEISMOMETER EVALUATION PROCEDURE SHORT PERIOD VERTICAL SEISMOMETER (LASA-SP APPLICATION) LMC-P1,
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 182 HC$3.00 MF$0.65

EVALUATION REPORT OF MARK PRODUCTS MODEL L-3A VERTICAL SEISMOMETER, SERIAL NO. 101 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 183 HC$3.00 MF$0.65

EVALUATION REPORT OF GEOTECH MODEL 20171A VERTICAL SEISMOMETER, SERIAL NO. 705 (LASA-SP APPLICATION),
Philco-Ford Corp Billings Mont Education and Technical Services Div
For primary bibliographic entry see Field 8K.
AD-658 184 HC$3.00 MF$0.65

GAIN COMPENSATED PHOTOPOLARIMETER FOR AIRBORNE MEASUREMENTS OF SKY-LIGHT POLARIZATION,
California Univ Los Angeles Dept of Meteorology
Gerald F. Chesebrough, Daniel F. Dibble, and C. R. Nagaraja Rao. Jun 67, 34p Rept no. Scientific-1
AFCRL-67-0396
Contract F19628-67-C-0196

Descriptors: (*Airborne, *Instrumentation), (*Polarization, Measurement), Sky, Light, Photoelectric effect, Spectrum analyzers, Intensity, Weight, Power, Telemeter systems, High altitude, Balloons, Photomultipliers, Design, Performance (Engineering), Gain, Meteorology.

The design and performance of a simple battery operated, electronic-servo governed photoelectric polarimeter are presented and discussed. A rotating Glan prism is used as the analyzer. Measurements of the degree of linear polarization and relative intensity variations can be made in four narrow spectral intervals (band width approximately equals 150 A) centered on wavelengths 3620, 4010, 5010 and 5990A. The variations in the intensity of the incoming light beam are compensated by varying the gain of the photomultiplier tube with the use of a programmable high voltage supply governed by an electronic servo the error signal for which is derived from the instantaneous value of the photosignal after rectification. Variations in intensity of three to four orders of magnitude can easily be accommodated with the present system. Because of its light weight, reasonably low power consumption and characteristic requirement of a single operational command, the polarimeter is eminently suited for use when both the operation and data acquisition are to be interfaced with a telemetry system as in a high altitude balloon flight. (Author)
AD-658 194 HC$3.00 MF$0.65

FILTER CRYSTAL PARAMETER MEASUREMENTS WITH FREQUENCY MODULATED SIGNALS (SWEEP FREQUENCY METHODS): FREQUENCY RANGE 1 MHz TO 350 MHz.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 9E.
AD-658 221 HC$3.00 MF$0.65

THE EXPLOSIVES MODELING FACILITY AT THE BALLISTIC RESEARCH LABORATORIES.
Memorandum rept.,
Ballistic Research Labs Aberdeen Proving Ground Md
James E. Cole. Jul 67, 21p Rept no. BRL-MR-1860

Descriptors: (*Explosive materials, Test facilities), Ordnance laboratories, Processing, Casting, Machining, Charges (Explosive).

The report describes the Explosive Modeling Facility of the Ballistic Research Laboratories (BRL). Some of the operations of the facility are discussed. Charges are made by cast loading, press loading, or machining high explosives. Strict quality control and safety practices are observed. The normal annual production is from five to seven thousand charges. (Author)
AD-658 226 HC$3.00 MF$0.65

ELLIPSOMETRY USING A RETARDATION PLATE AS COMPENSATOR,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 20F.
AD-658 247 Not available from CFSTI.

THE EXPERIMENTAL DETERMINATION OF AERODYNAMIC TOTAL-PRESSURE LOSSES FOR HEAT-EXCHANGER SURFACES CONSIDERED FOR THE 7- BY 10-FOOT TRANSONIC WIND TUNNEL,
David Taylor Model Basin Washington D C Aerodynamics Lab
Werner C. Steinle. Dec 51, 19p Rept no. Aero-807

Descriptors: (*Transonic wind tunnels, *Heat exchangers), Aerodynamic characteristics, Pressure, Configuration, Optimization, Surfaces.

Tests were performed to determine the aerodynamic total-pressure losses of several configurations of finned and bare tubing arranged as heat exchanger surfaces. The results indicate that a pressure coefficient (delta p/q) of 8.3 was obtained for the optimum finned tube arrangement which consisted of a six-row configuration containing 1.0-inch diameter tubing in 3.5-inch triangular pitch; the thin segmented and helically wrapped copper fins bonded to the tubing were spaced 10 per inch. (Author)
AD-658 331 HC$3.00 MF$0.65

CALIBRATION AND DIFFERENTIAL FIELD MEASUREMENT OF HIGH MAGNETIC FIELDS BY MEANS OF A PERIODIC SIZE EFFECT IN GALLIUM,
Massachusetts Inst of Tech Cambridge National Magnet Lab
S. Foner, and E. J. McNiff, Jr. 3 Jan 67, 6p
AFOSR-67-2157
Contract F44620-67-C-0047
Availability: Published in The Review of Scientific Instruments v38 n7 p931-4 Jul 1967.

Descriptors: (*Magnetic fields, Measurement), (*Gallium, *Calibration), Single crystals, Accuracy, Radiofrequency, Nuclear magnetic resonance, Aluminum, Probes.

The periodic size effect in pure single crystal gallium plates is applied to high field calibration and particularly to accurate differential measurements of high magnetic fields. A simple rf probe is described which is used to measure the characteristics of the size effect and to demonstrate the applicability of the method to such measurements up to about 100 kG to an accuracy of at least 1%. By combining aluminum powder and Mylar tape as markers in the rf probe, NMR calibration of the unit can be made during a single field sweep. The rf probe is small and readily adapted to a wide variety of field geometries. In addition to a brief description of the probe, the characteristics of the periodic size effect in gallium are summarized and the rf and dc dependence of the oscillatory amplitude of the periodic size effect are also discussed. (Author)
AD-658 350 Not available from CFSTI.

DIFFRACTION EFFECTS IN LORENTZ MICROSCOPY.
California Univ San Diego La Jolla
For primary bibliographic entry see Field 20C.
AD-658 363 Not available from CFSTI.

HEAT TRANSFER IN ROTATED ARCS WITH WATER-COOLED ELECTRODES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13A.
AD-658 373 HC$3.00 MF$0.65

ASTIGMATISM IN THE MACH-ZEHNDER INTERFEROMETER,
Defence Standards Labs Maribyrnong (Australia)
For primary bibliographic entry see Field 20F.
AD-658 404 Not available from CFSTI.

PROCUREMENT AND EVALUATION OF AN ANECHOIC CHAMBER.
Technical rept.,
Naval Avionics Facility, Indianapolis, Ind.
B. D. Rethmeyer, and Wayne A. Price. 1 Jul 64, 44p NAFI-TR-505

Descriptors: (*Antenna radiation patterns, *Test facilities), (*Anechoic chambers, Microwaves), Radar antennas, Wave transmission, Radar reflections, Calibration, Absorption, Attenuation, Specifications.

This report discusses methods to evaluate and to calibrate an anechoic chamber (indoor antenna range) and brings out the pitfalls that can be encountered in the procurement of an anechoic chamber. Procurement specifications for an anechoic chamber are also considered. (Author)
AD-813 309 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 1,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
CONF-660904-Vol-1 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 2,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
CONF-660904-Vol-2 HC$3.00 MF$0.65

THERMISTORIZED EBULLIOMETRY SYSTEM FOR DETERMINING MOLECULAR WEIGHTS OF FLUOROCARBONS,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 18.
K-1690 HC$3.00 MF$0.65

CHEMICAL YIELD DETERMINATIONS IN RADIOCHEMISTRY,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 18.
NAS-NS-3111 HC$3.00 MF$0.65

STANDARD REFERENCE MATERIALS: RECOMMENDED METHOD OF USE OF STANDARD LIGHT-SENSITIVE PAPER FOR CALIBRATING CARBON ARCS USED IN TESTING TEXTILES FOR COLORFASTNESS TO LIGHT,
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
For primary bibliographic entry see Field 11L.
NBS-MISC-PUB-260-15 HC$0.20 MF$0.65

DRAWINGS OF MICROMETER U-TUBE MANOMETERS FOR THE RANGES UP TO 100 mm OF MERCURY.
Technical note,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
A. M. Thomas, and J. L. Cross. 26 Aug 67, 18p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.15.

Descriptors: (*Manometers, Mechanical drawings), Pressure gages, Design.

Drawings with sufficient detail are presented so that micrometer U-tube manometers for use with mercury, oil, and water may be constructed. Measurements made with the oil manometer have an uncertainty of about 0.0004 mm of Hg plus one part in 10000 of the reading. Measurements made with the mercury manometer have an uncertainty of about 0.004 mm of Hg plus eight parts in 100000 of the reading. (Author)
NBS-TN-420 HC$0.15 MF$0.65

A SENSITIVE MAGNETIC BALANCE FOR THE DIRECT MEASUREMENT OF SKIN FRICTION DRAG,
LTV Research Center, Dallas, Tex.
J. G. Spangler. Dec 63, 79p Rept. no. 0-71000/3R-29
Contract NASw-730

Descriptors: (*Balances, *Skin friction), Measurement, Accuracy, Sensitivity, Calibration, Reliability, Shear stresses, Boundary layer, Magnetic fields.

The skin friction balance was shown to be a very sensitive instrument and provided consistent and repeatable data. The sensitivity is almost unlimited depending only on the extent to which the user wishes to go in amplifying and measuring the output signal. The repeatability was shown to be better than one percent both in the calibration and in shear stress measurements. The skin friction balance is in use as a permanent component in the boundary layer channel instrumentation complex. (Author)
N64-19298 HC$3.00 MF$0.65

ON SHIP EXPERIMENT TANK WITH WIND TUNNEL.
Tokyo Univ. (Japan). Inst. of Industrial Science.
S. Tamiya. Mar 67, 32p
in Japanese, English Summary Its Rept. of the Inst. of Ind. Sci., Vol. 17, No. 6

Descriptors: *Sea water, *Ship, *Tank, *Towed body, *Wind tunnel apparatus, Apparatus, Body, Conference, Drift, Effect, Experiment, Generation, Interaction, Model, Sea, Test, Tow, Water, Wave, Wind, Wind tunnel.

For abstract, see STAR 05 20.
N67-34014 HC$3.00 MF$0.65

CAPACITANCE PROPELLANT GAGING STUDY FOR ORBITING SPACECRAFT FINAL DEVELOPMENT REPORT.
Trans-sonics, Inc., Burlington, Mass.
Jun 67, 98p NASA-CR-87496
Contract NAS8-18059

Descriptors: *Capacitive fuel gauge, *Propellant tank, *Weightlessness, Capacitance, Charge, Cylinder, Distribution, Electric, Electrode, Environment, Equal, Error, Field, Fuel, Gauge, Hydrogen, Interface, Liquid, Oxygen, Propellant, Saturn s- ivb stage, Surface, Tank, Uniform, Weighting, Zero gravity.

For abstract, see STAR 05 20.
N67-34606 HC$3.00 MF$0.65

SUBSONIC WIND TUNNEL WALL CORRECTIONS.
Advisory Group for Aerospace Research and Development, Paris (France).
W. E. Acum, H. C. Garner, E. C. Maskell, and E. W. Rogers. Oct 66, 476p AGARDOGRAPH-109

Descriptors: *Interference, *Subsonic wind tunnel, *Wall, Application, Blocking, Bluff, Body, Calculation, Closed, Correction, Dimensional, Effect, Experiment, Formulation, High lift, Open, Subsonic, System, Three, Tunnel, Two, Unsteady, Ventilation, Wind, Wing.

For abstract, see STAR 05 20.
N67-34612 HC$3.00 MF$0.65

INFRA-RED RADIATION METHOD OF DETERMINING THERMAL DIFFUSIVITY, HEAT CAPACITY AND THERMAL CONDUCTIVITY OF SOLID MATERIALS.
National Aerospace Lab., Tokyo (Japan).
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-34640 HC$3.00 MF$0.65

DOUBLE-DRIVER SHOCK TUBE FOR SHOCK-ON- SHOCK SIMULATION.
Aeronautical Research Inst. of Sweden, Stockholm.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34803 HC$3.00 MF$0.65

A STATIC TEST RIG FOR THE MEASUREMENT OF THRUST EFFICIENCY AND DISCHARGE COEFFICIENT OF PROPELLING NOZZLE SYSTEMS.
Aircraft Research Association, Ltd., Bedford (England).
L. W. Akers. Apr 67, 26p ARA-WTN-62

Descriptors: *Discharge coefficient, *Nozzle thrust coefficient, *Shrouded nozzle, *Static testing, *Test equipment, *Thrust measurement, Calibration, Coefficient, Convergence, Design, Development, Discharge, Divergence, Efficiency, Equipment, Instrumentation, Measurement, Nozzle, Pressure, Propeller, Rig, Shroud, Static, Test, Testing, Thrust.

For abstract, see STAR 05 20.
N67-34839 HC$3.00 MF$0.65

HIGH RESOLUTION AUTORADIOGRAPHY.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
R. A. Ploc. Jun 67, 15p AECL-2704

Descriptors: *Autoradiography, *Radioactive material, Adsorption, Atom, Boundary, Dislocation, Grain, High resolution, Impurity, Location, Material, Metallurgy, Method, Radioactivity.

For abstract, see STAR 05 20.
N67-34901 HC$3.00 MF$0.65

DEVICE FOR THE AUTOMATIC LOADING OF LIQUID AIR VACUUM TRAPS.
Dispositivo Per Il Caricamento Automatico Di Trappole Per Vuoto Ad Aria Liquida
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
R. Crateri. 8 Nov 66, 11p ISS-66/41
in Italian, English Summary

Descriptors: *High vacuum, *Loading, *Pump, Air, Diffusion, Flux, Liquid, Nitrogen, Trap.

For abstract, see STAR 05 20.
N67-35155 HC$3.00 MF$0.65

APPARATUS FOR DETERMINING GASES IN METALS BY VACUUM FUSION.
Aparato Para La Determinacion de Gases en Metales Por Fusion en Vacio
Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
J. G. Di Primio, and E. Zuzek. 1967, 46p CNEA-186
in Spanish

Descriptors: *Fusion, *Gas density, *Vacuum equipment, Density, Equipment, Gas, Hydrogen, Instrumentation, Nitrogen, Oxygen, Purity, Separation, Vacuum.

For abstract, see STAR 05 20.
N67-35156 HC$3.00 MF$0.65

MEASUREMENT OF THE IONIZATION BEHIND HIGH VELOCITY PROJECTILES USING A CAVITY RESONATOR AND A HYPERFREQUENCY INTERFEROMETER.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 20.
N67-35184 HC$3.00 MF$0.65

TRANSIENT THERMAL BEHAVIOR OF SIMPLE STRUCTURES IN A SIMULATED SPACE ENVIRONMENT BY MODEL TESTING.
Illinois Univ., Urbana. Engineering Experiment Station.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-35262 HC$3.00 MF$0.65

INVESTIGATION OF THE COLLECTION EFFICIENCY OF FIBER FILTER ESPECIALLY CONCERNING RADIOACTIVE AEROSOLS.
Untersuchung des Abscheideverhaltens Von Faserfiltern Unter Besonderer Beruecksichti- Gung Radioaktver Aerosole
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Munich (West Germany). Inst. Fuer Physik Der Atmosphaere.
H. Schuster. May 67, 111p DLR-FB-67-35
in German, English Summary

Descriptors: *Aerosol, *Filter, *Radioactive material, Collection, Efficiency, Fiber, Latex, Material, Paraffin, Plastic, Polystyrene, Radioactivity.

For abstract, see STAR 05 20.
N67-35263 HC$3.00 MF$0.65

DESIGN OF A SELECTIVE MODULATION SPECTROMETER.
Etude D'un Spectrometre A Modulation Selective France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
A. Girard. 8 Feb 67, 63p ONERA-PUBL.-117/1967/
in French, English Summary

Descriptors: *Infrared spectrometer, *Spectral analysis, Analysis, Filter, Fourier transform, Grid, Image, Infrared, Linear, Modulation, Optical, Optics, Receiver, Selective, Spectral, Spectrometer, Spectrum.

For abstract, see STAR 05 20.
N67-35268 HC$3.00 MF$0.65

STUDIES OF FILTER MATERIALS WITH REGARD TO THEIR SUITABILITY FOR THE MEASUREMENT OF RADIOACTIVE AEROSOLS.
Untersuchungen An Filtermaterialien Auf Ihre Eignung Als Messfilter Zur Bestimmung Radioaktiver Schwebstoffe in Luft
Hauptverband Der Gewerblichen Berufsgenossenschaften, E. V., Bonn (West Germany).
D. Hasenclever. May 67, 38p EUR-3178.D
Contract EURATOM-004-62-12 PSTD
in German, English Summary

Descriptors: *Aerosol, *Filter, *Measuring apparatus, *Radioactivity, Air, Apparatus, Efficiency, Flow, Inlet, Measurement, Oil, Particle size, Velocity.

For abstract, see STAR 05 20.
N67-35273 HC$3.00 MF$0.65

RADAR TEST SET AN/UPM-98 AN/UPM-99 AN/UPM-111 TS-1253/UP. CODER SIMULATOR SM-189/UPM-99 SM-197/UPM-98. TEST LEAD MX-2681/UP.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-175 673 HC$3.00 MF$0.65

DETERMINATION OF EMBANKMENT DENSITY BY THE SEISMIC METHOD.
New York State Dept. of Public Works. Bureau of Physical Research.
For primary bibliographic entry see Field 13B.
PB-175 763 HC$3.00 MF$0.65

TABLE Y = ANTILOG X/20.
Engineering rept.,
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
D. H. Caldwell. 1 Dec 66, 94p ER-9

Descriptors: (*Naval research laboratories, Tables), Calibration, Voltage, Standards, Marine meteorology.

The report has been prepared to provide Navy Standards and Calibration Laboratories with a ready reference to convert voltage ratios to decibels or vice-versa. The table is used as follows: to convert a decibel value to its equivalent voltage ratio, the decibel value to the nearest 0.01 db is located along the X (I) column and then to the nearest 0.001 db along the X (I) row. The intersection of these two points yields the corresponding voltage ratio.
PB-175 765 HC$3.00 MF$0.65

PROCEEDINGS OF THE ATMOSPHERIC RESEARCH AIRCRAFT INSTRUMENTATION WORKSHOP AND SYMPOSIUM, NOVEMBER 17-18, 1966, OKLAMOMA CITY, OKLAMOMA.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-175 777 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS,
Naval Research Lab., Washington, D. C.
J. W. Butler, and C. A. Carosella. Aug 67, 52p
Also available on subscription at $15.00 per year - domestic; $18.00 per year - foreign. See also PB-175 569.

Descriptors: (*Naval research, Reports), Atmosphere, Astrophysics, Chemistry, Mechanics, Metallurgy, Ceramic materials, Radar, Radio interferometers, Direction finding, Solid state physics, Solar cells, Shielding, Electromagnetic properties.

Complete papers: The total electromagnetic energies possessed by convection currents; and shielding of solar cells against Van Allen belt protons. Summaries are given of research in the following fields: atmosphere and astrophysics, chemistry, mechanics, metallurgy and ceramics, radar, radio, and solid state physics.
PB-175 806 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
Sep 67, 52p
Also available on subscription, $15.00/yr domestic $18.00/yr foreign.

Descriptors: (*Naval research, Reports), Convection (Heat transfer), Energy, Thermoluminescence, Dosimeters, Metals, Corrosion, Metallurgy, Radar, Oceanology, Nuclear physics, Mechanics, Underwater sound.

Contents: On the electrokenetic energies of convection currents; LiF and CaF2:Mn thermoluminescent dosimeters in tandem. (Author)
PB-176 006 HC$3.00 MF$0.65

HOW TO UNDERSTAND SPECIAL RELATIVITY,
Division of Research (AEC), Washington, D. C.
For primary bibliographic entry see Field 20J.
For abstract, see NSA 21 18.
TID-23694 HC$3.00 MF$0.65

14C. Recording Devices

SIMPLIFIED AUTOMATIC DATA PLOTTER FOR FM/FM TELEMETER SYSTEMS 'SADAP',
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
H. B. Riblet. 27 May 53, 32p Rept no. CF-2042

Descriptors: (*Data processing systems, Telemeter systems), (*Photographic recording systems, Data processing systems), Frequency modulation, Automatic, Graphics, Magnetic tape, Timing circuits, Recording systems.

A new, simple, data-reduction device was designed and constructed. It consists of a standard playback and discrimination system for tape-recorded telemeter signals; an electronic system for the scaling of time signals; an an optical-mechanical system which simultaneously records on film a horizontal scale grid which may be nonlinear if the function requires it, vertical timing lines, and the galvanometer trace of the telemetered function. This device produces a continuous graphic plot of telemetered information on a linear or nonlinear scale (as may be necessary) with an accuracy within one per cent of manual plotting methods but in about 1/20 of the time. It requires complex electronic circuitry for the timing pulses only, yet it produces a trace of comparable quality to that of far more complex machines. (Author)
AD-658 086 HC$3.00 MF$0.65

THE TOTAL MAGNETIC FIELD VARIOMETER,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 8N.
AD-658 091 HC$3.00 MF$0.65

A DIGITAL MAGNETIC TAPE SYSTEM FOR RECORDING RADAR DATA,
Naval Research Lab Washington D C
For primary bibliographic entry see Field 17I.
AD-658 329 HC$3.00 MF$0.65

A VIBRATION AMPLITUDE RECORDING SYSTEM FOR AEROSPACE DESIGN EVALUATION STUDIES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
I. B. Irving, and J. S. Milne, Jr. 24 Mar 61, 15p Rept no. CF-2925
Contract NOrd-7386

Descriptors: (*Vibration, *Recording systems), Accelerometers, Vibrators (Mechanical), Cathode

followers, Guided missile components, Spacecraft components, Environmental tests.

The system described is a four-channel recorder system where vibration amplitudes from four selected positions can be compared to each other at any vibration frequency between 10 and 2000 cycles per second. The data is presented as four continuous records of amplitude against a frequency mark on the edge of the record which is coded against a printed tape record of frequency. The system is composed of commercially available equipment and has an overall calibrated accuracy of plus or minus 10%. (Author)
AD-658 376 HC$3.00 MF$0.65

14D. Reliability

UNBIASED ESTIMATES OF RELIABILITY WHEN TESTING AT ONLY ONE EXTREME STRESS LEVEL,
Picatinny Arsenal Dover N J Quality Assurance Div
A. Bulfinch. Dec 63, 27p

Descriptors: (*Reliability, Test methods), Stresses, Numerical methods and procedures, Accuracy, Sensitivity, Errors, Inequalities.

Based on the stress-strength concept of reliability for 'one-shot' items, it is assumed that an item cannot fail until the stress equals or exceeds the strength. From this premise and the following additional assumptions, methods are given for calculating unbiased estimates of nontime dependent reliability: (1) The relation between the stress and strength standard deviations are known approximately. (2) A single stress level is applied during testing at approximately three standard deviations from the average stress level. (3) The stress and strength distributions are normal. Calculations are included to show the effect of errors in the assumptions concerning the standard deviations, applied stress level, and rounding-off errors. This approach further reduces the sample size required to demonstrate high non-time dependent reliability in laboratory testing. It has the added advantage of obtaining unbiased estimates of reliability with the simplest of testing methods. (Author)
AD-657 676 HC$3.00 MF$0.65

MODELING OF INTEGRATED CIRCUIT EFFECTIVENESS (MICE).
Radio Corp of America Camden N J Defense Electronic Products
For primary bibliographic entry see Field 9E.
AD-658 199 HC$3.00 MF$0.65

FACTORS THAT AFFECT OPERATIONAL RELIABILITY OF TURBOJET ENGINES.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 21E.
PB-175 852 HC$3.00 MF$0.65

14E. Reprography

IMPACT OF FEEDBACK ON ACCURACY OF CONFIDENCE LEVELS ASSIGNED BY INTERPRETERS.
Army Behavioral Science Research Lab Washington D C
For primary bibliographic entry see Field 5J.
AD-657 583 HC$3.00 MF$0.65

RAPID SCREENING OF TACTICAL IMAGERY AS A FUNCTION OF DISPLAY TIME.
Army Behavioral Science Research Lab Washington D C
For primary bibliographic entry see Field 5H.
AD-657 584 HC$3.00 MF$0.65

COMPOSITION, COPYING, AND SEMI-MECHANIZED FILING AND SEARCHING DEVICES,
Herner and Co Washington D C
For primary bibliographic entry see Field 5B.
AD-657 734 Not available from CFSTI.

COORDINATE READER AND CARD PUNCH OR TABULATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9B.
AD-658 131 HC$3.00 MF$0.65

DETERMINATION OF THE LUMINANCE IN EACH POINT OF A RAPIDLY MOVING SYMMETRICALLY ROTATING SPRING BY PHOTOGRAPHIC IMAGE.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 17H.
For abstract, see STAR 05 20.
N67-34984 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15B. Chemical, Biological, and Radiological Warfare

UNCONVENTIONAL WARFARE BIBLIOGRAPHY SUPPLEMENT NO. 4.
American Univ., Washington, D. C. Special Operations Research Office.
For primary bibliographic entry see Field 15D.
AD-452 176 HC$3.00

UNCONVENTIONAL WARFARE BIBLIOGRAPHY, SUPPLEMENT NO. 5.
American Univ., Washington, D. C. Special Operations Office.
For primary bibliographic entry see Field 15D.
AD-461 201 HC$3.00

THE RELATIONSHIP BETWEEN THE RADIOBIOLOGICAL EFFECTS TABLE AND TACTICAL MILITARY RADIATION MEASUREMENT SYSTEM DESIGN,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6S.
AD-657 932 HC$3.00 MF$0.65

15C. Defense

COMMUNICATION IMPACT: A CONCEPTUAL MODEL ANALYSIS OF INDIVIDUAL PREDISPOSITIONS AND THE IMPACT OF A COUNTY CIVIL DEFENSE EDUCATIONAL PROGRAM.
Final rept.,
Iowa State Univ Ames Dept of Sociology and Anthropology
George M. Beal, Gerald E. Klonglan, Joe M. Bohlen, and Paul Yarbrough. Mar 67, 360p Rept no. Rural Sociology-41
Contract OCD-PS-65-9

Descriptors: (*Communication systems, Impact), (*Civil defense systems, Rural areas), Predictions, Attitudes, Reaction (Psychology), Decoding, Social psychology, Recall, Nuclear warfare, Protection, Education, Attention, Perception (Psychology), Fallout shelters, Nuclear weapons.

The study deals with communication at three levels. The first level involves the development of a generalized model of the process by which communication achieves impact. The second level is the operationalization of the impact model. The third level is testing the degree to which the model predicts the response of members of the potential audience to a specific communication event. The communication impact model developed in this study takes the intent and content of the communication message as given and then proceeds to examine the responses which the total potential audience makes. A basic notion included in the model is that in receiving and responding to a message, the receiver must perform several functions. These functions can be logically integrated into a flow of action, the stages of action representing a series of communication filters. Three major filter stages are delineated: attention, comprehension and acceptance. The attention filter stage has four sub-stages: awareness, attend decision, differential exposure and secondary contact. The acceptance stage has two sub-stages: attitudinal acceptance and overt action. Another basic notion included in the model is that the response of a receiver at any given filter stage is not random. Rather the receiver is predisposed--through his previous experience, through what he perceives to be his interest--to react to a given message in a predictable manner. The communication event analyzed is the Midwest County Civil Defense Exhibit. The findings of this analysis strongly support the notions included in the impact model. Implications of these findings for civil defense communicators are drawn from the findings. (Author)
AD-657 598 HC$3.00 MF$0.65

FEDERATION OF MALAYA, NUTRITION SURVEY SEPTEMBER-OCTOBER 1962.
Interdepartmental Committee on Nutrition for National Defense Washington D C
For primary bibliographic entry see Field 6P.
AD-657 980 HC$3.00 MF$0.65

MANUAL OF DATA PROCESSING STANDARDS.
Defense Intelligence Agency Washington D C
For primary bibliographic entry see Field 9B.
AD-658 158 HC$3.00 MF$0.65

CONCEPTUAL DESIGN OF A CIVIL DEFENSE RESCUE SYSTEM WITH A SUPPLEMENT ON COMMUNITY MANPOWER RESOURCES.
Final rept. (Phase 2),
Stanford Research Inst Menlo Park Calif
John L. Crain, and Lacy G. Thomas. Aug 67, 138p

NRDL-TRC-67-01
Contract N00228-66-C-0523

Descriptors: (*Civil defense systems, *Rescues), Manpower studies, Leadership, Organizations, Command + control systems, Nuclear warfare, Evacuation, Urban areas, Tables.
Identifiers: Postattack operations.

Culminating several years of research on the problem of rescue after nuclear attack, this study reviews past work and presents a preliminary design of a general rescue system. In this system, the population would be dormant during the non-crisis period, but would be aroused at the earliest sign of a crisis, to prepare for attack and to carry out postattack rescue operations under recognized local leaders. In each urban area, this leadership would be provided by a small group or cadre drawing upon neighborhood leadership through an inactive reserve of citizen organizations. The cadre would supply the continuing readiness in peacetime under the guidance of the OCD. (Author)
AD-658 159 HC$3.00 MF$0.65

COMBATING LOW-FLYING TARGETS,
Foreign Technology Div Wright-Patterson AFB Ohio
V. A. Zalepa. 26 Apr 67, 56p Rept no. FTD-MT-66-169
TT-67-62853
Edited machine trans. of mono. Borba s Nizkoletyashchimi Tselyami, Moscow, 1966 p1-64.

Descriptors: (*Antiaircraft defense systems, Reports), USSR, Aerial warfare, Antiaircraft ammunition, Rockets, Aircraft interception, Guided missiles (Surface-to-air), Aircraft intercept control systems, Low-altitude bombing, Bombers.

The pamphlet was written on the basis of materials found in the open Soviet and foreign press. It acquaints the reader with the peculiarities of combat with low-flying targets and certain questions regarding the construction of antiaircraft defense in United States. In it there are the basic characteristics of means of attacking from low altitudes, certain types of antiaircraft guided missiles for combating low-flying targets, and methods of their combat use as well as a short characteristic of control systems of the subdivisions of antiaircraft guided missiles. (Author)
AD-658 250 HC$3.00 MF$0.65

15D. Intelligence

UNCONVENTIONAL WARFARE BIBLIOGRAPHY SUPPLEMENT NO. 4.
Research memo.,
American Univ., Washington, D. C. Special Operations Research Office.
Nancy Ann Gardner. Oct 64, 55p SORO-RM-64-14
See also AD-404 755, basic document.

Descriptors: (*Unconventional warfare, Bibliographies), Military strategy, Psychological warfare, Military tactics, History, Abstracts, Indexes.

Contents: Fundamental elements of unconventional warfare; (theory, strategy, legality, administrative matters, unconventional warfare operations, semi-conventional forces); Historical models of unconventional warfare in insurgencies; (pre-World War II experience, World War II experience, post-World War II experiences). (Author)
AD-452 176 HC$3.00

UNCONVENTIONAL WARFARE BIBLIOGRAPHY, SUPPLEMENT NO. 5.
Research memo.,
American Univ., Washington, D. C. Special Operations Office.
Nancy Currier. Jan 65, 41p SORO-RM-65-1
Research supported in part by Department of the Army, Washington, D. C. See also AD-404 755, basic document.

Descriptors: (*Unconventional warfare, Bibliographies), Military strategy, Psychological warfare, Military tactics, History, Abstracts, Indexes.

Contents: Fundamental elements of unconventional warfare; (theory, strategy, legality, administrative matters, unconventional warfare operations, semi-conventional forces); Historical models of unconventional warfare in insurgencies; (pre-World War II experience, World War II experience, post-World War II experience). (Author)
AD-461 201 HC$3.00

IMPACT OF FEEDBACK ON ACCURACY OF CONFIDENCE LEVELS ASSIGNED BY INTERPRETERS.
Army Behavioral Science Research Lab Washington D C
For primary bibliographic entry see Field 5J.
AD-657 583 HC$3.00 MF$0.65

15E. Logistics

UNCONVENTIONAL WARFARE BIBLIOGRAPHY SUPPLEMENT NO. 4.
American Univ., Washington, D. C. Special Operations Research Office.
For primary bibliographic entry see Field 15D.
AD-452 176 HC$3.00

UNCONVENTIONAL WARFARE BIBLIOGRAPHY, SUPPLEMENT NO. 5.
American Univ., Washington, D. C. Special Operations Office.
For primary bibliographic entry see Field 15D.
AD-461 201 HC$3.00

USE OF TAERS DATA IN ARMY MAINTENANCE MANAGEMENT,
Army Materiel Command Washington D C
For primary bibliographic entry see Field 5A.
AD-657 637 HC$3.00 MF$0.65

LABORATORY SHRINKAGE EVALUATION OF NOMEX SUMMER FLIGHT SUITS,
Naval Air Engineering Center Philadelphia Pa Aeronautical Materials Lab
Warren T. Kelly. 19 Apr 67, 6p Rept no. NAEC-AML-2604

Descriptors: (*Flight clothing, Shrinkage), (*Fire resistant textiles, Shrinkage), Polyamide plastics, Cleaning compounds, Cleaning, Camouflage.

Shrinkage of coveralls made of olive green and camouflage printed Nomex herringbone twill cloths laundered by Formula S is reported. Coverall dimensions, except for crotch seam that apparently puckers, are not shortened excessively. (Author)
AD-657 853 HC$3.00 MF$0.65

UNIFORM AUTOMATED DATA PROCESSING SYSTEM FOR SUPPLY MANAGEMENT,
Naval Supply Systems Command Washington D C
For primary bibliographic entry see Field 5A.
AD-657 881 Not available from CFSTI.

LOW-TEMPERATURE TRACTION RUBBER SOLE COMPOUND FOR DMS COMBAT FOOTWEAR.
Army Natick Labs Mass Clothing and Organic Materials Div
For primary bibliographic entry see Field 11J.
AD-658 060 HC$3.00 MF$0.65

PROPOSAL FOR THE ELECTRIC MOTOR REPAIR FACILITY IN SUBMARINE TENDERS AS-36 AND AS-37.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 13J.
AD-658 094 HC$3.00 MF$0.65

PORTERAGE PARAMETERS AND TABLES,
Rand Corp Santa Monica Calif
J. Wallace Higgins. Aug 67, 55p Rept no. RM-5292-ISA/ARPA
Contracts DAHC15-67-C-0158, DAHC15-67-C-0142

Descriptors: (*Armed forces supplies, *Transportation), (*Logistics, *Armed forces transportation), Costs, Terrain, Food, Manpower, Tables, Portable.

Tables and computation methods for evaluating the load that can be carried by porters under various conditions. The logistic importance of porterage has been a disputed issue in American military planning. This study shows quantitatively its value in such areas as Thailand and Vietnam, and its costliness and inefficiency in areas of jungle and mountain. Data were drawn from specific historical accounts, much of it unclassified data from classified RAND publications. The most detailed information is from UN and North Korean experience in the Korean conflict, the Viet Minh planning factors in Indochina, and the 1963 American expedition up Mt. Everest. Weight carried and daily travel distance were related to the geographic, military, and physical conditions. Average ton-miles per man/day range from .04 to .21 and speed varies from 1.8 to 3 mph, depending on terrain, illumination, etc. Methods of estimating trail capacity and the probability of observation are given, and different staging policies are evaluated.
AD-658 096 HC$3.00 MF$0.65

THE DOMESTIC AIR FREIGHT INDUSTRY AND INTRODUCTION OF LARGE SUBSONIC TRANSPORTS,
Analytic Services Inc Falls Church Va
For primary bibliographic entry see Field 1B.
AD-658 397 HC$3.00 MF$0.65

MANAGEMENT OF CONTRACTOR DATA AND REPORTS. VOLUME II: AUTHORIZED DATA LIST.
Air Force Systems Command, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-172 870-I HC$3.00 MF$0.65

ELECTRIC, ELECTRONIC HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
For primary bibliographic entry see Field 5A.
PB-175 713 HC$3.00 MF$0.65

15G. Operations, Strategy, and Tactics

UNCONVENTIONAL WARFARE BIBLIOGRAPHY. SUPPLEMENT NO. 7.
Research memo.,
American Univ., Washington, D. C. Special Operations Research Office.
Nancy Currier. Jul 65, 72p RM-65-8

Descriptors: (*Unconventional warfare, Bibliographies), Military strategy, Indexes, Military tactics, Counterinsurgency.

Contents: A counterinsurgency bibliography; A psychological operations bibliography; Unconventional warfare: An interim bibliography; A selected bibliography on unconventional warfare; Unconventional warfare bibliography. (Author)
AD-473 881 HC$3.00 MF$0.65

ENVIRONMENTAL CHARACTERISTICS OF TUNNELS IN SOUTH VIETNAM,
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 13M.
AD-657 599 HC$3.00 MF$0.65

REVIEW OF THE CHINESE COMMUNIST ARMY IN ACTION: THE KOREAN WAR AND ITS AFTERMATH; THE CHINESE PEOPLE'S LIBERATION ARMY,
Rand Corp Santa Monica Calif
Alexander George, Samuel B. Griffith, II, and Alice Langley Hsieh. Aug 67, 5p Rept no. P-3665
Availability: Published in The Annals of the American Academy of Political and Social Science.

Descriptors: (*Armed forces (Foreign), *Communists), (*Armed forces operations, China), Leadership, Behavior, Performance (Human), Officer personnel, Prisoners, Motivation, Morale, Vietnam, Military personnel, Military strategy, Military tactics, Communism.

The author examines the factors that motivated the Chinese soldiers and enabled them to fight so well in the early phases of the Korean campaign, and the forces that eroded Chinese fighting capabilities in the spring of 1951. General Griffith's study is a useful introduction to the history of the PLA for the layman or the undergraduate. It vividly traces the development of the PLA from the Nanch'ang insurrection through the Korean War to the period of modernization, with an epilogue on the cultural revolution as of January 1967.
AD-657 753 Not available from CFSTI.

COMBATING LOW-FLYING TARGETS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 15C.
AD-658 250 HC$3.00 MF$0.65

COMMUNIST OUTLOOK ON WAR,
Rand Corp Santa Monica Calif
Thomas W. Wolfe. Aug 67, 48p Rept no. P-3640
Availability: Published in Soviet System and Democratic Society: A comparative Encyclopedia n.d. Copyrighted, HC available from RAND Corp., Santa Monica, Calif $2.00.

Descriptors: (*Communism, *Military strategy), (*Foreign policy, Communists), Leadership, Disarmament, Warfare, Military tactics, Political science, National defense, War potential, Deterrence.

Communist thinking on war has been shaped by many factors--Marxist-Leninist theory, the historical experience and policies of the Soviet state, the personalities of various leaders, interaction with the West, the impact of modern technology, the rise of a rival center of Communist power and ideological authority in Peking, to mention a few. The author comments on the matter of differences which have tended to set the Communist interpretation of war apart from that generally to be found in the West and then discusses the evolution of the Communist outlook on war in light of such formative influences mentioned above.
AD-658 393 Not available from CFSTI.

16. MISSILE TECHNOLOGY

16B. Missile Trajectories

DERIVATION OF FORMULAS FOR BOOST PHASE TRAJECTORY CALCULATION OF MISSILE-BOOSTER WITH FLEXIBLE JOINT AND INITIAL BODY MISALIGNMENT,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
L. L. Cronvich. 8 Apr 53, 11p Rept no. CF-1995

Descriptors: (*Guided missile trajectories, Equations of motion), Guided missiles, Booster motors, Force (Mechanics), Moments, Equations, Misalignment, Rocket motors, Flexible couplings.

In order to study the effect on boost phase dispersion of flexibility of the joint between the missile and the booster, 'dynamic' boost trajectories must be computed which include flexibility. The object of this report is to derive the necessary formulas for calculation of such trajectories, with allowance for the possibility of an initial misalignment of the missile-booster combination of beta sub o radians. Unless some misalignment exists the effect of joint flexibility is usually negligible.
AD-658 113 HC$3.00 MF$0.65

EFFECT OF A PROBE ON THE DRAG AND PRESSURE DISTRIBUTION OF A HEMISPHERICAL NOSE,
General Dynamics/Pomona Calif
Paul H. Jackson, Jr. 3 Jun 54, 32p
Contract NOrd-9028
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2140.

Descriptors: (*Nose cones, Supersonic characteristics), (*Probes, Supersonic characteristics), Drag, Pressure, Wind tunnels, Tests, Angle of attack, Conical bodies, Flow separation, Hemispherical shells.
Identifiers: Bumblebee project.

Wind tunnel tests were conducted over a Mach number range of 1.50 to 2.25 at a Reynolds' number of approximately 500,000 per inch in order to determine the effect of an extended probe on the drag and pressure distribution of a hemispherical nose. The drag is reduced on the order of 25% to 40% by extending the probe to its optimum length, with the larger reductions occurring at higher Mach numbers. At angles of attack above 6 degrees the reduction in drag is negligible. The conical region of separated air formed on the probe acts as a solid body, generating shock waves and pressures which correspond closely to conical theory. Normal forces on the probe were also investigated and found to be small. (Author)
AD-658 157 HC$3.00 MF$0.65

AN ANALYSIS OF THE BIAS AND PRECISION ESTIMATES OF TRAJECTORY MEASURING SYSTEMS (OPERATION PRECISE ROUND NUMBER 4).
Special rept.,
Army Test and Evaluation Command White Sands Missile Range N Mex Deputy for National Range Engineering
Oliver Lee Kingsley, and Burton L. Williams. Jul 66, 100p Rept no. RE-S-66-2

Descriptors: (*Guided missile trajectories, *Radar tracking), Radar equipment, Flight testing, Velocity, Acceleration, Errors, Instrumentation, Radar beacons, Data processing systems, Position finding, Tables, Analysis, Measurement.
Identifiers: White Sands Missile range.

The report presents an analysis of the bias and precision of three major range instrumentation tracking systems; the Askania cinetheodolite system, the Contraves cinetheodolite system, and the AN/FPS-16 Radar system. Four flight tests have been conducted at White Sands Missile Range under a program called Operation Precise. The major portion of this report is devoted to analysis of data from the fourth flight test (Round No. 4). Information presented includes precision and bias estimates for trajectory position, velocity, acceleration, and trajectory angle data from the specified tracking systems. Normal data reduction techniques were used. The methods of analysis are disin detail. (Author)
AD-658 231 HC$3.00 MF$0.65

SOUND RANGING COMPUTATIONS FOR SOUNDING ROCKET RECOVERY.
Tuab Teleutredningar A.B., Solna (Sweden). Space Technology Group.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 20.
N67-34216 HC$3.00 MF$0.65

16D. Missiles

ACCURATE DETERMINATION OF THE MOMENT OF INERTIA AND CENTER OF GRAVITY POSITION OF WIND TUNNEL MODELS.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 14B.
AD-658 155 HC$3.00 MF$0.65

LMSC PUBLISHED CONTRIBUTIONS, 1966 IMPRINTS: A CITATION BIBLIOGRAPHY,
Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 5B.
AD-658 396 HC$3.00 MF$0.65

THE AERODYNAMIC PROBLEMS OF THE SOUNDING- ROCKET VEHICLES.
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34950 HC$3.00 MF$0.65

ANALYSIS OF PRESSURE MEASUREMENTS TAKEN AT ALTITUDES BETWEEN 30 AND 90 KM BY CONE-CYLINDER PITOT-STATIC PROBES,
Sandia Corp., Albuquerque, N. Mex.
For primary bibliographic entry see Field 22B.
For abstract, see NSA 21 17.
SC-RR-67-251 HC$3.00 MF$0.65

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

INFLUENCE OF BANDWIDTH RESTRICTION ON THE SIGNAL-TO-NOISE PERFORMANCE OF A PCM/NRZ SIGNAL.
European Space Technology Center, Delft (Netherlands).
H. Martinides, and G. L. Reijns. Dec 66, 34p
ESRO-TM-16

Descriptors: *Heat transfer, *Iterative solution, *Pulse code modulation (pcm), *Signal to noise ratio, *Thin plate, Band, Bandwidth, Bit, Detection, Detector, Error, Fourier analysis, Frequency, Integrator, Noise, Radio, Restriction, Signal, Signal detection, Telemetry, Transmission.

For abstract, see STAR 05 20.
N67-34945 HC$3.00 MF$0.65

17B. Communication

NETWORK TIMING FOR COMMUNICATION SATELLITES.
Research paper,
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
J. W. Schwartz. Nov 64, 20p RP-P-159
IDA/HQ-64-3157
Contract SD-50

Descriptors: (*Communication satellites (Active), *Satellite networks), (*Timing devices, Communication satellites (Active)), Signals, Synchronization (Electronics), Relays, Amplifiers, Beacons, Design.

The paper presents a general procedure for timing all signals according to a single schedule in a communication satellite network consisting of several ground stations using a single satellite relay. The procedure gives promise of easy implementation and considerable accuracy. Design problems are indicated, and it is argued that a clock should be put in the satellite and timing information broadcast on a beacon signal. The paper briefly discusses ways in which system performance is enhanced by network timing.
AD-456 159 HC$3.00

LIGHTNING PROTECTION OF BURIED CABLE BY SEMI-CONDUCTING JACKETS,
Northern Electric Co. Ltd., Montreal (Quebec).
H. D. Campbell. Dec 65, 20p

Annual Wire and Cable Symposium (14th), Atlantic City, N. J., 2 Dec 65.

Descriptors: (*Telephone lines, *Protective coverings), (*Semiconductors, Protective coverings), Lightning, Underground, Damage, Water, Corrosion, Moistureproofing, Electric currents, Voltage, Polyethylene plastics, Temperature, Failure (Electronics), Soils, Resistance (Electrical), Lightning arresters.

Semi-conducting jackets on buried telephone cable will be subjected to heavy surge currents caused by local lightning strokes to ground. The impulse current strength of a semi-conducting polyethylene compound having a nominal resistivity of 20 ohm-cm, is measured and the effects of some environmental factors assessed. It is concluded that the probability of surge current rupture of the cable jacket in service is very small except when direct strokes to the cable occur. (Author)
AD-479 569 HC$3.00 MF$0.65

CONTROLLING POLYETHYLENE INSULATED WIRE CAPACITANCE,
Western Electric Co., Inc., Omaha, Neb.
For primary bibliographic entry see Field 9A.
AD-479 572 HC$3.00 MF$0.65

COMMUNICATION IMPACT: A CONCEPTUAL MODEL ANALYSIS OF INDIVIDUAL PREDISPOSITIONS AND THE IMPACT OF A COUNTY CIVIL DEFENSE EDUCATIONAL PROGRAM.
Iowa State Univ Ames Dept of Sociology and Anthropology
For primary bibliographic entry see Field 15C.
AD-657 598 HC$3.00 MF$0.65

ELECTROMAGNETIC INTERFERENCE MEASUREMENT METHODS-SHIELDED ENCLOSURE.
Georgia Inst of Tech Atlanta Engineering Experiment Station
For primary bibliographic entry see Field 20N.
AD-657 669 HC$3.00 MF$0.65

CHINESE COMMUNIST COMMUNICATIONS NETWORKS.
Library of Congress Washington D C Aerospace Technology Div
21 Sep 67, 18p Rept no. ATD-67-44
TT-67-62791
Rept. on Surveys of Chinese Communist Scientific and Technical Literature.

Descriptors: (*Communication systems, *Networks), Transmitter-receivers, Pulse amplifiers, Transistors, Voltmeters, Circuits, Frequency shift, Microwave equipment, Telemeter systems, Remote control systems, Meters, Frequency, Generators, Electronic equipment, Bandwidth, Digital systems, China.

The study is the second report in the series reviewing Chinese Communist Communications Networks. It is based on open-source materials available at the Aerospace Technology Division and the Library of Congress. The 13 abstracts are arranged alphabetically by author. (Author)
AD-657 771 HC$3.00 MF$0.65

TOWARD ECONOMICAL REMOTE COMPUTER ACCESS,
Carnegie Inst of Tech Pittsburgh Pa Dept of Computer Science
For primary bibliographic entry see Field 9B.
AD-657 783 HC$3.00 MF$0.65

A PRELIMINARY INVESTIGATION OF CERTAIN ASPECTS OF INTONATION,
University Coll London (England)
P. Denes. 1959, 18p
Contract AF 61 (514)-1176
Availability: Published in Language and Speech v2 pt2 p106-22 Apr-Jun 1959.

Descriptors: (*Speech representation, *Intelligibility), (*Voice communication systems, *Speech recognition), Language, Phonetics, Linguistics, Speech transmission, Sound, Intensity.

Intonation is the linguistic form in which the speaker organizes certain kinds of information. It is well-known that intonation is related to the fundamental frequency pattern of the speech wave, but it must also be related to changes along other acoustic dimensions because the intonation 'tones' are still recognisable in whispered speech. The fundamental frequency, intensity, spectrum and duration changes associated with six intonation 'tones' were investigated. The need for further work of this kind was indicated. The relation of acoustic variables and intonation was further investigated by using speech synthesis. Syllables with the same spectrum and intensity were generated in which the fundamental frequencies were controlled by the intensity variations of humanly-produced syllables spoken on six different intonation 'tones'. The test established that the synthesized syllables conveyed some of the information about the intonation of the humanly-produced syllables. Methods for carrying out experiments on intonation with phonetically untrained subjects were investigated. The need for further experiments using methods of speech analysis and synthesis along lines indicated is pointed out. The importance for analysis-synthesis telephony of more extensive knowledge about intonation is discussed in some detail.
AD-657 861 Not available from CFSTI.

THE EFFECT OF BSC ON PCM PICTURE QUALITY.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 9D.
AD-657 910 Not available from CFSTI.

RATE OF SPEAKING: I. RELATIONSHIP BETWEEN ORIGINAL AND REPEATED PHRASES,
Kenyon Coll Gambier Ohio
Charles Lightfoot. 10 May 48, 26p
SPECDEVCEN-411-1-1
Contract N7onr-411 (01)

Descriptors: (*Speech, Intelligibility), Stimulation, Response, Speech transmission, Speech recognition, Psychoacoustics.

Three related experiments were designed to discover what relationship might obtain between the rate of saying a phrase (stimulus) and rate of repeating that phrase (response) under three conditions: (1) when several groups of phrases are originated by a single speaker who uses a different rate for each group; (2) when a number of phrases are originated by a single speaker who varied his rate from phrase to phrase; (3) when each of several groups of phrases is originated by a different speaker who speaks at his usual rate. Phonograph recordings of five-syllable phrases representing the various experimental conditions and stimulus rates were played to 25 subjects who had been instructed to repeat into a microphone each phrase, taking care to talk naturally. The repetitions were carried to a graphic power level recorder which furnished an accurate means of measuring the duration of each response. Mean response duration for each stimulus rate and for each condition was determined. On the basis of Fisherian analysis of the data, the following conclusions seem to be indicated for the population sampled: (1) there is a positive relationship between duration of original and repeated phrases under all three conditions. (2)The relationship is not rectilinear when stimuli include phrases presented at a very slow rate. (3) The same sort of relationship does not prevail for all three conditions whether stimulus rates are within the range commonly found among speakers or whether extremely slow rates are used. (4) Response rate is also influenced by factors other than stimulus rate. (Authro)
AD-657 943 HC$3.00 MF$0.65

SOME EFFECTS OF THE COMMON COLD UPON SPEECH: PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES.
Technical rept.,
Kenyon Coll Gambier Ohio
Charles Lightfoot. 12 Aug 49, 28p
SPECDEVCEN-411-1-8
Contract N7onr-411 (01)

Descriptors: (*Speech, Intelligibility), Adenoviruses, Diseases, Respiratory diseases, Speech transmission, Speech recognition, Phonetics, Sprays, Nose, Psychoacoustics, Voice communication systems.

An attempt was made to obtain information about the influence a cold might have upon speaking. Specific questions posed for investigation were the following: (1) To what extent does having a cold affect a speaker's intelligibility or vocal quality. (2) If a cold modifies speech, does the effect vary with different acoustical conditions under which the listeners res nd. (3) Does nasal spraying with a vasoconstricting agent influence the relationships implied by the preceding questions. (4) Are such relationships associated with medical symptoms which characterize a cold or with phonemes which require nasal emission of sounds.
AD-657 945 HC$3.00 MF$0.65

RATE OF SPEAKING: IV. EFFECTS OF THE MODE AND LEVEL OF TRANSMITTING MESSAGES UPON THE RELATIONSHIP BETWEEN THEIR DURATION AND THE DURATION OF THEIR REPETITION.
Technical rept.,
Kenyon Coll Gambier Ohio
Charles Lightfoot. 13 Aug 49, 17p
SPECDEVCEN-411-1-9
Contract N7onr-411 (01)

Descriptors: (*Speech transmission, Intelligibility), Speech, Psychoacoustics, Speech recognition, Voice communication systems.

An experiment was conducted to determine the extent to which the relationship between syllabic rates of original and repeated messages might be affected by (1) the mode of transmitting the originals and (2) the intensity level of their transmission. Equally readable phrases--some read rapidly, some slowly, and some at an intermediate rate--were presented to each of a number of subjects (Ss) instructed to repeat each message in his usual way of speaking. Some mess ges were recorded, and the recorded versions were played through a loudspeaker or through headphones; some emanated directly from the lips of the reader. The intensity level f the messages was low for some Ss, moderate for others, and high for others. The duration of the average of the repetitions of messages presented at one rate and ver one transmission system was determined for each S. From these individual measures group means were computed and the differences among the experimental conditions they represented were evaluated. (Author)
AD-657 946 HC$3.00 MF$0.65

RADIO SOURCES AND PECULIAR GALAXIES,
California Inst of Tech Pasadena
Robert V. Wagoner. 20 Feb 67, 4p
Research supported in part by Nonr and NSF.
Availability: Published in Nature v214 n5090 p766-9 May 20 1967.

Descriptors: (*Radio transmission, Sources), (*Galaxies, Radio transmission), Statistical analysis, Measurement, Frequency, Stars.

Statistical analyses of the distribution of quasars and radio galaxies over the sky suggest that they may be associated with certain types of peculiar galaxies. (Author)
AD-657 976 Not available from CFSTI.

A PROPOSAL FOR WIRED CITY TELEVISION,
Rand Corp Santa Monica Calif
H. J. Barnett, and E. A. Greenberg. Aug 67, 36p Rept no. P-3668

Descriptors: (*Closed circuit television, Urban areas), Costs, Economics, Coaxial cables, Effectiveness.

A national system of wired city television (WCTV), inexpensively interconnected, is proposed as the best avenue to more and more varied programs. Television would then have capacity and incentive to educate, inform, and entertain specialized interests as well as general interests and mass tastes.
AD-658 011 HC$3.00 MF$0.65

AN ADAPTIVE TECHNIQUE FOR MULTIPLE SIGNAL DETECTION AND IDENTIFICATION,
Rome Air Development Center Griffiss AFB N Y
John W. Sammon, Jr. Aug 67, 47p Rept no. RADC-TR-67-260

Descriptors: (*Adaptive communication systems, Detection), Adaptive systems, Identification, Signals, Pattern recognition, Probability, Theory, Probability density functions.

The problem of detecting and identifying multiple signals which are corrupted by independent additive noise is mathematically formulated. It is explicitly assumed that (1) the epoch and time duration of the signals are known, (2) the statistics of the corrupting noise are known, (3) the number of signals and their individual shapes are not known, and (4) the a priori probabilities of the occurrence of the individual signals are not known. An adaptive technique is developed to determine (1) the number of signals, (2) the signal shapes, and (3) the relative frequency of each signal's occurrence. The adaptive procedure uses only the observations made at the receiver output. Computer simulated results are given for the case of Gaussian noise. These results clearly indicate that approximate detection and identification can be achieved adaptively. (Author)
AD-658 015 HC$3.00 MF$0.65

COMMUNICATIONS NETWORKS.
Rept. no. 8 on ATD work assignment no. 33,
Library of Congress Washington D C Aerospace Technology Div
W. Podpaly. 21 Sep 67, 37p Rept no. ATD-67-41
TT-67-62821
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Communication systems, *Networks), Communication equipment, Electric cables, Transmitter-receivers, Amplifiers, Voltage, Design, Circuits, Radio communication systems, Computers, Facsimile equipment.

Contents: Communications equipment; Communications facilities and their location; Bibliography. (Author)
AD-658 017 HC$3.00 MF$0.65

RANDOM STORE AND FORWARD COMMUNICATION NETWORKS WITH APPLICATIONS TO PATTERN RECOGNITION.
Columbia Univ Dobbs Ferry N Y Hudson Labs
For primary bibliographic entry see Field 9D
AD-658 136 HC$3.00 MF$0.65

MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS.
Technical summary rept.,
Selenia Industrie Elettroniche Associate S P A Rome (Italy)
Ing. D. Formato, and Ing. A. Gilardini. 30 Apr 60, 39p Rept no. 1
Contract AF 61 (052)-145

Descriptors: (*Radio transmission, Plasma medium), (*Ionospheric propagation, Very low frequency), Italy, Microwaves, Theory, Experimental data, Whistlers, Propagation, Magnetic fields.

Magneto-ionic propagation in a cylindrical plasma of circular cross-section has been investigated theoretically and experimentally in a straight and in a curvilinear geometry. The microwave signal transmitted through a plasma generated from an RF discharge in Neon has been measured as a function of the discharge power, of the magnetic field, of the gas pressure and of the pitch angle of the helical winding, used as a mode-selective input. The experimental results have been explained by the theory of the magneto-ionic propagation in an ionized medium with a plasma frequency larger than the signal frequency. The theoretical results and their implications n the ionospheric interpretation of whistler atmospheric behaviour are also discussed. (Author)
AD-658 197 HC$3.00 MF$0.65

A STOCHASTIC MODEL OF MESSAGE INTERCHANGE ON A CHANNEL WITH TRANSMISSION DELAY.
Revised ed.,
New York Univ N Y Dept of Electrical Engineering
Paul T. Brady. 19 Jan 67, 10p
AFOSR-67-2130
Grant AF-AFOSR-24-65
Revision of manuscript submitted 27 Jan 66.
Availability: Published in IEEE Transactions on Communication Technology vCOM15 n3 p405-12 Jun 1967.

Descriptors: (*Communication systems, Delay circuits), (*Stochastic processes, Communication systems), Probability, Information theory, Mathematical models.

The paper describes a technique for analyzing the statistical behavior of a two-way communication system with transmission del y (D). Messages are transmitted and received by means of servers located at the terminal stations. If D > O, each server is uncertain of the present state of the other, and may initiate transmission when the other has already begun to transmit, thus causing message interference. Interference is measured as the amount of one server's transmission which arrives at the other server when it is already transmitting. The relationship between the size of the delay and the amount of interference is studied here, as well as other quantities that describe the system behavior. The exact solution is available only for D = O, but an approximate solution is found for very small D with respect to the lengths of idle periods of the servers, and the asymptotic solution is obtainable for very long D. The particular communication system analyzed is a very simple one, but the mathematical technique of handling the delay can be applied to more el orate systems. (Author)
AD-658 255 Not available from CFSTI.

A RECEIVER WITH A SYNCHRONOUS PARAMETRIC AMPLIFIER,
Foreign Technology Div Wright-Patterson AFB Ohio
V. V. Boiko, and Yu. V. Dagaev. 21 Feb 67, 17p
Rept no. FTD-HT-66-275
TT-67-62871
Priemnik s Sinkhronnym Parametricheskim Usilitelem, unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 3: Fizika, Astronomiya (USSR), v20 n3 p64-72 1965.

Descriptors: (*Radio receivers, Parametric amplifiers), USSR, Feedback amplifiers, Pumping (Electronics), Selection, Synchronization (Electronics), Radar receivers, Bandwidth.

A receiver with a degenerate parametric input amplifier that operates in a synchronous mode is theoretically and experimentally investigated. Synchronous pumping is obtained by means of a special feedback loop. It is shown that the appropriate frequency selection of the first heterodyne expands the frequency band of the synchronous mode with strong resonance. (Author)
AD-658 369 HC$3.00 MF$0.65

MAGNETOSTRICTIVE DELAY LINE MEMORY FOR TRANSIT 4A,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 9B.
AD-658 374 HC$3.00 MF$0.65

NBS STANDARD FREQUENCY AND TIME SERVICES. RADIO STATIONS WWV, WWVH, WWVB, WWVL.
National Bureau of Standards, Washington, D. C. 1967, 14p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.15.

Descriptors: (*Radio stations, Standards), (*Standards, Radio transmission), Time, Frequency, Sound pitch, Signals, High frequency, Low frequency, Very low frequency, Corrections.

Detailed descriptions are given of eight technical services provided by the National Bureau of Standards radio stations WWV, WWVH, WWVB, and WWVL. These services are: (1) Standard radio frequencies; (2) Standard audio frequencies; (3) Standard musical pitch; (4) Standard time intervals; (5) Time signals; (6) UT2 corrections; (7) Radio propagation forecasts; and (8) Geophysical alerts. In order to provide users with the best possible services, occasional changes in the broadcasting schedules are required. This publication shows the schedules in effect on June 1, 1967. Annual revisions will be made. Advance notices of changes occurring between revisions will be sent to regular users of these services upon request. Current data relating to standard frequencies and time signals are also available monthly in the Time and Frequency Services Bulletin. (Author)
NBS-MP-236 HC$0.15 MF$0.65

SIMULTANEOUS TRANSMISSION OF TWO SOUND CHANNELS IN TELEVISION.
Japan Broadcasting Corp., Tokyo.
Y. Fujii, and S. Yamane. Mar 67, 16p
Its Ser. No. 109

Descriptors: *Channel, *Sound, *Television transmission, Division, Frequency, Interference, Language, Modulation, Noise, Pulse, Radio, Television, Translation, Transmission.

For abstract, see STAR 05 20.
N67-34691 HC$3.00 MF$0.65

CHARACTERISTICS OF A SPLIT PHASE TELECOMMUNICATIONS LINK.
National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Tex.
W. E. Zrubek. Sep 67, 19p NASA-TN-D-4163
Contract 914-40-92-99-72

Descriptors: *Link, *Phase modulation, *Telecommunication, Bandwidth, Carrier, Characteris-

ics, Data, Division, Function, Lock, Loop, Modulation, Noise, Operation, Output, Performance, Phase, Power, Receiver, Reference, Signal, Spectrum, Splitting, Time, Tracking.

For abstract, see STAR 05 20.
N67-34898 HC$3.00 MF$0.65

THE FEASIBILITY OF A DIRECT RELAY OF APOLLO SPACECRAFT DATA VIA A COMMUNICATION SATELLITE.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. E. Schmid. Aug 67, 52p NASA-TN-D-4048
Contract 150-22-12-00-51

Descriptors: *Apollo spacecraft, *Communications satellite, *Data transmission, Antenna, Communications, Data, Direct, Earth, Effect, Factor, Feasibility, Fixed, Frequency, Limit, Orbit, Perturbation, Relay, S-band, Satellite, Station, Transfer, Transmission, Transmitter, Very high, Voice.

For abstract, see STAR 05 20.
N67-34981 HC$3.00 MF$0.65

STUDY OF MODULATION TECHNIQUES FOR MULTIPLE ACCESS SATELLITE COMMUNICATIONS.
International Business Machines Corp., Rockville, Md. Federal Systems Div.
10 May 64, 369p NASA-CR-87479, TR-54-154
Contract NAS5-3544

Descriptors: *Communication system, *Ground station, *Multiplexer, *Pulse code modulation (pcm), *Satellite communication, Access, Code, Communication, Evaluation, Ground, Logic, Modulation, Multiple, Pcm, Pseudonoise, Pulse, Satellite, Station, System, Theory, Tracking.

For abstract, see STAR 05 20.
N67-35234 HC$3.00 MF$0.65

17C. Direction Finding

A REPORT ON ARMY PARTICIPATION IN PROJECT VANGUARD.
Army Map Service Washington D C
May 59, 36p

Descriptors: (*Satellite tracking systems, Army), Military facilities, Scientific satellites.
Identifiers: Vanguard project.

The report describes the Army's responsibilities for the installation, operation, and maintenance of a portion of the 'MINITRACK' satellite tracking system.
AD-657 592 HC$3.00 MF$0.65

THE TRANSIT DOPPLER TRACKING STATION DIGITAL SYSTEM: A SUMMARY,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Malcolm B. Greenlee. 15 Dec 60, 11p Rept no. CF-2905
Contract NOrd-7386

Descriptors: (*Satellite tracking systems, Doppler systems), Navigation satellites, Tracking, Digital systems, Clocks, Accuracy, Circuits, Time.

Contents: System accuracy considerations; The doppler digitizing system and clock; Tape playback clock; Control and output circuits; Satellite time information.
AD-658 375 HC$3.00 MF$0.65

17F. Magnetic Detection

ON CURRENTS PRODUCING THE MAIN PHASE OF A MAGNETIC STORM,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 8N.
AD-658 380 HC$3.00 MF$0.65

17G. Navigation and Guidance

ERROR SENSITIVITY ASSOCIATED WITH ORBITAL HYPERBOLIC-NAVIGATION SCHEMES AND A SUGGESTED APPROACH FOR IMPROVEMENT,
Rand Corp Santa Monica Calif
J. H. Hutcheson. Jul 67, 40p Rept no. P-3636
Prepared for presentation at AGARD Symposium on 'Advanced Navigational Techniques', 12-15 Sep 67, Milan (Italy).

Descriptors: (*Hyperbolic navigation, Errors), (*Navigation satellites, Hyperbolic navigation), Sensitivity, Range finding, Geometry, Loran.

This paper deals with the fundamental mathematical relationships applicable to satellite-linked hyperbolic systems in general (i.e., direct or inverse, the direction of the propagation paths being insignificant). Error expressions are developed for determining the sensitivity of a system to uncertainties in measurement and to satellite geometry. A LORAN satellite system involves obtaining lines of position from the intersection of hyperboloids of revolution with a spherical earth. The resultant second-order equations are solved by a computer using iterative techniques. Solutions in the form of error sensitivities are presented for a number of vehicle-satellite geometric configurations. A particular problem arises when the receiving stations and the propagating sources are located in certain geometrical configurations. Results are presented from the standpoint of navigators' lines of position (LOP's) intersecting at unfavorable angles that can cause the sensitivity to error to become unbounded. The problem becomes more complicated if satellite relative motion is involved because the orientation of the LOP's will change as a function of time. However, results indicate that certain general statements can be made regarding the number of satellites needed and the configurations necessary to meet a specified set of operational requirements. It is pointed out that known satellite velocity information is not being exploited in range only or hyperbolic satellite systems, and it is recommended that further study be directed to the area of the multisatellite, multielement fix-determination processing using range-rate doppler data. (Author)
AD-657 751 HC$3.00 MF$0.65

A STATISTICAL ANALYSIS OF YAW STEERING FOR SPACE MISSIONS,
Aerospace Corp El Segundo Calif El Segundo Technical Operations
J. M. Baker. Jun 67, 33p Rept no. TR-1001 (2121-10)-1
SSD-TR-67-135
Contract AF 04 (695)-1001

Descriptors: (*Steering, Yaw), (*Spacecraft, Steering), Statistical analysis, Errors, Equations of motion, Distribution functions, Velocity.

By using a simple steering law, the amount of propellant required to steer to a particular plane in space is derived. A statistical formulation of the required characteristic velocity is presented, based on a prior knowledge of the yaw position and yaw velocity errors. From the numerical results for the typical missions given, it is shown that the required characteristic velocity is usually small. It is thus concluded that only a slight propellant saving would be achieved by using other proposed yaw steering laws. (Author)
AD-657 769 HC$3.00 MF$0.65

MEASUREMENT AND PREDICTION OF GROUP VELOCITY AT VERY LOW RADIO FREQUENCIES.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 20N.
AD-657 949 HC$3.00 MF$0.65

THE STABILITY OF A SINGLE-DEGREE-OF-FREEDOM FREE GYRO,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
James R. Jacques. 14 Apr 53, 10p Rept no. CF-2003

Descriptors: (*Gyroscopes, Stability), Equations, Dynamics.

A particular single degree of freedom free gyro with a simple proportional servo is investigated and found to be unstable. Further study reveals that the introduction of a lead + lag network into the servo can achieve stability. Calculations reveal that no significant loss in stability is suffered when the lead + lag is replaced by a simple lag. Near optimum realizable stability may be chosen with a lag time constant low enough to assure quick response of the gyro with little overshoot. The optimum time constant of the lag network is found to be 0.004 sec. (Author)
AD-658 129 HC$3.00 MF$0.65

SUMMARY OF ANALYSIS OF EFFECT OF GIMBAL COMPLIANCE ON OPERATION OF A RATE GYROSCOPE,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
F. C. Paddison, and N. A. Brigham. 16 Jul 54, 11p Rept no. CF-2245
Contract NOrd-7386

Descriptors: (*Gimbals, *Gyroscopes), Resonant frequency, Damping, Equations of motion, Differential equations, Momentum, Analysis, Transfer functions.

Experience with rate gyros has shown a consistent change (decrease) in the resonant frequency, and increase in the damping of the gyro about its output axis when the gyro wheel was turned on. An intuitive explanation for this effect was that compliance in the gyro gimbals and mounting allowed energy to be taken from the moving output gimbal; since as the output gimbal moves, there is a torque about the gyro input axis proportional to the gyro wheel angular momentum and the angular velocity of the output gimbal. Gyros having large angular momentums and high resonant frequencies are consequently the gyros in which this might be a problem. This memorandum documents briefly the results of MADDIDA studies to explain the reason for the change in resonant frequency; secondly, to show experimental verification of the equations derived by this analysis. No conclusions are drawn since it is self-evident that if the gyro transfer characteristics are to be known over an extended range of frequencies, this should indicate the need for a good deal of information about the gyro's characteristics. (Author)
AD-658 146 HC$3.00 MF$0.65

ATC CONCEPTS FOR SUPERSONIC VEHICLES. PART II - I.
Interim rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Andrew L. Sluka. Aug 67, 75p
FAA-RD-67-38
See also N67-13246.

Descriptors: (*Air traffic control systems, *Supersonic planes), (*Transport planes, Air traffic control systems), Air traffic, Display systems, Flight simulators, Flight paths.
Identifiers: Supersonic transport aircraft.

The simulation study investigated domestic and oceanic SST operations to and from John F. Kennedy International Airport in a simulated alpha numeric system representing a 1970 ATC environment. The study experimented with ATC aiding SSTs to place acceleration overpressure in sterile or sparsely populated areas, transitioning SSTs to and from parallel one-way track systems above FL 430 and the use of alpha numerics and flight path projection. Results showed that alpha numerics and flight path projection will aid in controlling supersonic operations. More expeditious ATC handling for the SST is possible by the provision of parallel one-way routes whereas the assignment of the same routes to opposite direction SST traffic is undesirable. (Author)
AD-658 166 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE ECONOMIC VALUE OF AIR TRAFFIC CONTROL IMPROVEMENTS AND APPLICATION TO ALL-WEATHER LANDING SYSTEMS, VOLUME I.
United Research Inc Cambridge Mass
1966, 27p
Contract FAA/BRD-17
See also Volume 2, AD-658 215.

Descriptors: (*Air traffic control systems, Cost effectiveness), (*Instrument landings, *All-weather aviation), Economics, Costs, Civil aviation, Aviation safety.

The method as applied to an all-weather landing system concludes the following: Additional demand leading to increased revenues to air carriers, $11,500,000; cost savings to air carriers, $9,379,000; cost savings to general aviation, $292,000; value of accidents prevented, $3,791,000. Since the annual operating costs of an all-weather landing system were not available, the annual net return of this ATC improvement was not calculated. A further conclusion based upon a detailed study of the installation of all-weather landing systems at 22 airports (a stratified sample of all approach control airports in the United States) shows that: 50% of the total dollar benefits would be realized if installations were made at only 14 airports. (Author)
AD-658 214 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE ECONOMIC VALUE OF AIR TRAFFIC CONTROL IMPROVEMENTS AND APPLICATION TO ALL-WEATHER LANDING SYSTEMS, VOLUME II.
Technical notes.
United Research Inc Cambridge Mass
1966, 116p
Contract FAA/BRD-17
See also Volume 1, AD-658 214.

Descriptors: (*Air traffic control systems, Cost effectiveness), (*Instrument landings, *All-weather aviation), Economics, Costs, Civil aviation, Aviation safety.

Contents: Evaluation of benefits in dollar terms: the economic theory; Estimating the demand for commercial air transport; The effects of price and reliability on demand; Determination of cost effects of improvements; Analysis of probability of avoiding aviation accidents; Methods of estimating the physical gain from new airway and airport facilities; Results of the analysis of delay, diversion, and cancellation; Dollar benefits from all-weather landing system installations; Methods of multivariate regression; Weather at the sample airports during 1957; Sources of data - demand analysis.
AD-658 215 HC$3.00 MF$0.65

THE IMPLICATIONS OF ALL-WEATHER LANDING IN THE U.K.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
O. B. St. John. Feb 67, 24p Rept no. RAE-TR-67032
Presented at the Congress of the International Council of Aeronautical Sciences (5th), London (England), Sep 1966.

Descriptors: (*Instrument landings, *All-weather aviation), (*Civil aviation, Great Britain), Visibility, Aviation safety, Pilots, Airports.

Automatic landing systems are likely to be in regular service during 1967, with civil airlines, but it will be some years before safe landings are being made in really low visibility conditions. The report summarises the present situation in the United Kingdom, with regard to all-weather landing, and makes suggestions to solve the problems that will arise. In particular, there is a need to study the role of the pilot during low visibility landings, and to provide the right airfield environment which will enable a safe automatic landing to be made in all weather conditions. (Author)
AD-658 309 HC$3.00 MF$0.65

TEST AND EVALUATION OF THE RADAR VIDEO DATA PROCESSOR.
Final rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Albert A. Lupinetti, and Roy P. Schindler. Jun 67, 180p Rept no. NS-67-1

Descriptors: (*Data processing systems, Radar signals), Air traffic control systems, Video signals, Radar beacons, Position finding, Radar target designators, Data transmission systems.

The Radar Video Data Processor (RVDP) processes primary and secondary raw radar information to derive aircraft position and to extract identity and altitude code information. The processed data are in digital format and are remoted over narrow-band telephone lines. Detailed tests of the RVDP detection criteria did not reveal any unexplainable deviations from detection theory. The on-line tests indicated that system sensitivity and track-thru-clutter capability compared favorably with unprocessed radar data remoted by conventional wide-band systems. In the course of the test program certain modifications were incorporated into the RVDP, and at the conclusion of the test program other modifications were recommended. It is concluded that the RVDP represents a suitable design for the reliable detection and processing of primary and secondary radar information for the National Airspace System. (Author)
AD-658 337 HC$3.00 MF$0.65

RADAR CONTINUOUS-WAVE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17I.
AD-658 370 HC$3.00 MF$0.65

PHASE DIFFERENCE NAVIGATION SATELLITE STUDY INTERIM SCIENTIFIC REPORT.
Radio Corp. of America, Moorestown, N. J.
Jun 67, 526p NASA-CR-87443
Contract NAS12-509

Descriptors: *Air traffic control, *Marine navigation, *Navigation satellite, Accuracy, Air, Aircraft, Characteristics, Communications, Control, Equipment, Error, Ground, Implementation, Marine, Navigation, Performance, Position, Prediction, Processing, Satellite, Shift, Signal, Station, Support, Surveillance, System, Traffic.

For abstract, see STAR 05 20.
N67-34257 HC$3.00 MF$0.65

FEED-BACK ACCELEROMETER CIRCUITS WITH A VELOCITY OUTPUT.
Aeronautical Research Council (Gt. Brit.)
For primary bibliographic entry see Field 1D.
For abstract, see STAR 05 20.
N67-34664 HC$3.00 MF$0.65

A LINEARIZED ERROR ANALYSIS OF ON-BOARD PRIMARY NAVIGATION SYSTEMS FOR THE APOLLO LUNAR MODULE.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-34897 HC$3.00 MF$0.65

STUDY PROGRAM ON (30-100 G HZ) ELECTRONICALLY STEERABLE ANTENNA SYSTEMS QUARTERLY REPORT, 20 SEP. 1966 - 20 JAN. 1967.
Advanced Technology Corp., Timonium, Md.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-34998 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL STUDY OF A NUCLEAR INDUCTION GYROMETER.
Etude Theorique Et Experimentale Du Gyrometre A Induction Nucleaire
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
G. Hanuise. 1967, 55p ONERA-PUBL.-118/1967/
in French, English Summary

Descriptors: *Angular velocity, *Gyromagnetism, *Nuclear gyroscope, *Nuclear magnetic resonance, Angular, Detector, Earth, Equation, Excitation, Field, Gyroscope, Induction, Magnetic, Nuclear, Parallel, Perpendicular, Resonance, Rotation, Shielding, Signal, Velocity.

For abstract, see STAR 05 20.
N67-35167 HC$3.00 MF$0.65

THE EFFECT OF LIFT ON ENTRY CORRIDOR DEPTH AND GUIDANCE REQUIREMENTS FOR THE RETURN LUNAR FLIGHT.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Thomas J. Wong, and Robert E. Slye. 26 Feb 60, 20p NASA-TR-R-80
AD-242 358, N62-70504

Descriptors: (*Atmosphere entry, Guidance), (*Homing devices, *Spacecraft), Deceleration, Space flight, Moon, Velocity, Stability, Control.

Corridors for manned vehicles are defined consistent with requirements for avoiding radiation exposure and for limiting values of peak deceleration. Use of lift increases the depth of the entry corridor. Mid-course guidance requirements appear to be critical only for the flightpath angle. Increasing the energy of the transfer orbit increases the required guidance accuracy for the flight-path angle. Corrective thrust applied essentially parallel to the local horizontal produces the maximum change in perigee altitude for a given increment of velocity. Energy required to effect a given change in perigee altitude varies inversely with range measured from the center of the earth. (Author)
PB-175 885 HC$3.00 MF$0.65

17H. Optical Detection

SPECTRAL TRANSMISSION OF TWO OPTICAL SYSTEMS.
Royal Aircraft Establishment Farnborough (England)

For primary bibliographic entry see Field 20F.
AD-657 593 HC$3.00 MF$0.65

OPTICAL SOUNDING III.
New York Univ N Y Geophysical Sciences Lab
For primary bibliographic entry see Field 4A.
AD-657 601 HC$3.00 MF$0.65

EVALUATION OF LENSES FOR USE IN ALL-SKY PHOTOMETERS,
Los Alamos Scientific Lab N Mex
Guy E. Barasch. Jun 67, 20p Rept no. LA-3727
Contract W-7405-ENG-36, ARPA Order-631

Descriptors: (*Photometers, *Lenses), (*Nuclear explosions, Detection), Design, Effectiveness, Light, Photomultipliers, Signal-to-noise ratio, Response, Measurement, Fluorescence, X rays.

For maximum performance, an all-sky photometer should have a large light-collection area and a narrow spectral passband; however, for a given size of photometer, these parameters cannot be optimized simultaneously. Three compromise lens designs are evaluated here: LASL-2, a 0.43-in.-focal-length, f/2.8, 160 degrees-field-of-view lens for use with a 2-in.-diam. photomultiplier tube; and, for use with 5-in.-diam. photomultiplier tubes, LASL-5 a 2.1-in.-focal-length, f/4.0, 120 degrees-field-of-view lens; and EG+G-5, a lens with a nominal 120 degrees field of view, which can be used with or without an ND2 filter covering the central part of the first element. The effective on-axis entrance-pupil areas and the relative response curves as a function of wavelength and incidence angle were measured, and the results are reported. Therefore, LASL-5 photometers are recommended for systems like the Los Alamos Air Fluorescence Detection System, which for optimum performance require wide-field photometers with narrow, well defined, spectral passbands. (Author)
AD-657 955 HC$3.00 MF$0.65

DETERMINATION OF THE LUMINANCE IN EACH POINT OF A RAPIDLY MOVING SYMMETRICALLY ROTATING SPRING BY PHOTOGRAPHIC IMAGE.
Determination de La Luminance en Chaque Point D'une Source de Revolution, en Mouvement Ultra-rapide, A Partir D'enregistrements Photographiques
Institut Franco-allemand de Recherches, St. Louis (France).
P. Smigielski, and J. Vauvrecy. 22 Dec 65, 23p
ISL-T-43/65
in French

Descriptors: *Integral equation, *Luminous intensity, *Photographic measurement, Density, Emulsion, Equation, Integral, Intensity, Light, Luminosity, Measurement, Movement, Photographic, Plasma, Reentry, Rotation, Source, Symmetry.

For abstract, see STAR 05 20.
N67-34984 HC$3.00 MF$0.65

171. Radar Detection

OPTIMUM PROCESSING OF UNEQUALLY SPACED RADAR PULSE TRAINS FOR CLUTTER REJECTION,
Rand Corp Santa Monica Calif
L. E. Brennan, and I. S. Reed. Aug 67, 12p Rept no. P-3657

Descriptors: (*Radar clutter, Inhibition), Processing, Optimization, Coherent radiation, Radar pulses, Matrix algebra.

Coherent variably spaced pulse trains can be processed using a time domain representation, i.e., describing the signal processor by a set of complex weights applied to the successive pulses rather than by a filter transfer function. The variations in clutter return during the pulse train are expressed in terms of a covariance matrix rather than a frequency spectrum. Using this approach, methods of selecting the optimum set of complex weights for a pulse train are derived. A test based on the likelihood ratio is discussed and an optimum set of complex weights is obtained for detecting targets of known doppler frequency. A more tractable criterion, based on the maximum signal-to-clutter ratio, is developed for selection of the pulse weights. The analogous problem for equally spaced pulse trains has been discussed by Rummler. With equally spaced trains, the design problem is one of selecting an optimum set of complex weights for the pulses and of specifying the interpulse spacing. With variable spacings there is the additional problem of selecting a good interpulse spacing code. No direct method for optimizing the spacing code was found. It is shown that for a particular form of the clutter autocorrelation function, the covariance matrix can be inverted and an analytic expression obtained for system performance as a function of target doppler frequency. This should be useful in testing different spacing codes so that one can be selected for a particular system application.
AD-657 755 HC$3.00 MF$0.65

MODIFICATION OF BACKSCATTERING OF A LOOP BY IMPEDANCE LOADING,
Michigan State Univ East Lansing Div of Engineering Research
J. L. Lin, and K. M. Chen. 20 May 67, 201p Rept no. Scientific-3
AFCRL-67-0429
Contract AF 19 (628)-5732

Descriptors: (*Radar echo areas, Backscattering), Rings, Differential equations, Rectangular bodies, Metals, Electrical impedance, Theory, Electromagnetic waves, Illumination.

In the report the modification of the backscattering of a loop by the impedance loading method is investigated theoretically and experimentally. First of all, the resonant phenomena of a loop when illuminated by an electromagnetic wave is studied. Next, the backscattering of a circular conducting loop is considered and the impedance loading method is applied to minimize its backscatter. Finally, the minimization of the backscattering of a rectangular loop is investigated. In the theoretical analysis, a new method based on a differential equation for the loop current is developed for the case of a circular loop. For the case of a rectangular loop an existing method is applied with slight modification. Throughout the entire analysis, the principle of superposition is applied to simplify the problem of an illuminated loaded loop to the combination of an illuminated solid loop and a radiating loop. The major objectives of the theoretical analysis are to determine the induced current on a loaded loop, the scattered field from a loaded loop and the optimum impedance which, when loaded on the loop, makes the backscatter of the loop vanish. Extensive experimental study was also conducted. The resonant phenomena of a solid loop was investigated carefully. The impedance loading technique was then applied to the circular and the rectangular loops to minimize their backscatters. In the course of this experiment, the backscatter of a loop was successfully minimized to the noise level. (Author)
AD-657 799 HC$3.00 MF$0.65

SOME OBSERVATIONS PERTINENT TO THE THEORY OF RADAR SCATTERING BY CLOUDS,
Northeastern Univ Boston Mass Dept of Electrical Engineering
Harold R. Raemer. 31 May 66, 55p Rept no. Scientific-1
AFCRL-66-500
Contract AF 19 (628)-4956

Descriptors: (*Radar signals, Scattering), (*Meteorological radar, *Clouds), Theory, Electromagnetism, Meteorology, Probability.

Various aspects of the theory of radar scattering by clouds are delineated. It is demonstrated that various ways of viewing single scattering by particle aggregates (i.e. summation, Siegert-Goldstein, turbulent scatter) are in fact theoretically equivalent. Other topics discussed are: effects of receiver bandwidth, some points about the statistics of particle scattering, and a theory advanced by D. Atlas to explain discrepancies of 8-10 db between theoretical and observed cloud echo intensities. (Author)
AD-657 808 HC$3.00 MF$0.65

A SIMPLE FLYING SPOT SCANNER AS A RADAR VIDEO GENERATOR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
R. C. Shreckengost, and R. J. Carpenter. 9 Sep 54, 48p Rept no. CF-2282
Contract NOrd-7386

Descriptors: (*Signal generators, *Scanning), Radar signals, Video signals, Plan position indicators, Sweep generators, Photographs.

The report describes the construction and operating characteristics of a simple flying spot scanner designed primarily to generate radar video from conventional PPI radar photographs. (Author)
AD-658 128 HC$3.00 MF$0.65

EXPECTED FADE-TIME FOR RAYLEIGH DISTRIBUTED RANDOM FUNCTION,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
L. M. Spetner. 14 Nov 52, 12p Rept no. CF-1892

Descriptors: (*Radar signals, Statistical analysis), Random variables, Probability, Transformations (Mathematics), Signal-to-noise ratio, Attenuation.

An expression is derived for the expected length of time a Rayleigh distributed function will remain below a given threshold level. This represents the expected fade-time of a radar signal. (Author)
AD-658 140 HC$3.00 MF$0.65

AN ANALYSIS OF THE BIAS AND PRECISION ESTIMATES OF TRAJECTORY MEASURING SYSTEMS (OPERATION PRECISE ROUND NUMBER 4).
Army Test and Evaluation Command White Sands Missile Range N Mex Deputy for National Range Engineering
For primary bibliographic entry see Field 16B.
AD-658 231 HC$3.00 MF$0.65

A DIGITAL MAGNETIC TAPE SYSTEM FOR RECORDING RADAR DATA,
Naval Research Lab Washington D C
P. L. Watkins, J. M. Goodman, and A. M. Knopp. 24 Jul 67, 42p Rept no. NRL-6584
ARPA Order-32-60

Descriptors: (*Magnetic recording systems, Radar signals), Digital recording systems, Data, Magnetic tape, Scanning, Data storage systems, Analog-to-digital converters, Monitors.

A versatile multichannel medium-speed data system for recording radar data on magnetic tape directly in digital-computer format was designed for use with the Randle Cliff Radar facility at the Naval Research Laboratory's Chespeake Bay Division, and it is currently installed and operating there. Input data to the system can be analog voltages, which are internally digitized, or digital codes. Timing and reference data are internally generated. The system operates with three simultaneous data scanning rates: (a) basic (radar pulse repetition frequency), (b) submultiple, and (c) a multiple of the basic. Both the sequence and the amount of data sampled at each rate is patchboard-

controlled. Any basic scan rate from 6 pulses per second to 3 kilo-pulses per second can be generated, depending on the volume of data. Data are recorded as sequential sevenbit characters at constant density, without intermediate storage, over the full range of trigger rates, through the choice of six tape speeds. Selected portions of the data can be monitored by an on-line printer and lamp display, during recording. Further checks can be made during playback of recorded tapes. The system has developed into an unusually successful preoperational monitoring device for itself and for nearly the complete radar system, in addition to being a versatile and dependable recording system. (Author)
AD-658 329 HC$3.00 MF$0.65

TEST AND EVALUATION OF THE RADAR VIDEO DATA PROCESSOR.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 17G.
AD-658 337 HC$3.00 MF$0.65

RADAR CONTINUOUS-WAVE,
Foreign Technology Div Wright-Patterson AFB Ohio
N. P. Supryaga. 5 Apr 67, 103p Rept no. FTD-MT-65-521
TT-67-62870
Edited machine trans. of mono. Radiolokatsiya s Nepreryvnym Izlucheniem, Moscow, 1963 p1-123.

Descriptors: (*Continuous wave radar, Operation), USSR, Doppler radar, Radar stations, Radio altimeters, Radar navigation, Radio proximity fuzes, Airborne.

The book deals with characteristic features, main merits and deficiencies of continuous-wave radar systems. Section II treats continuous-wave radio altimeters of the STR-41, AM220 and Selford type.
AD-658 370 HC$3.00 MF$0.65

NOTE ON PROBING BALLOON MOTION BY DOPPLER RADAR.
National Severe Storms Lab., Norman Okla.
For primary bibliographic entry see Field 4B.
PB-175 930 HC$3.00 MF$0.65

17J. Seismic Detection

COLLECTION AND ANALYSIS OF SEISMIC WAVE PROPAGATION DATA.
Michigan Univ Ann Arbor Inst of Science and Technology
For primary bibliographic entry see Field 8K.
AD-657 802 HC$3.00 MF$0.65

18. NUCLEAR SCIENCE AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

THEORETICAL ANALYSIS OF PLASMA CONFINEMENT IN A ROTATING MAGNETIC FIELD,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 20I.
AD-658 383 HC$3.00 MF$0.65

NUCLEAR FUSION VOL 5 NO. 4 1965: SELECTED ARTICLES,
Div. of Technical Information Extension (AEC), Oak Ridge, Tenn.
1965, 122p
TT-67-61682
Trans. from Nuclear Fusion (Austria) v5 n4 p267-78, p299-329 1965.

Descriptors: (*Plasma medium, *Thermonuclear reactions), (*Plasma oscillations, *Plasma physics), Electromagnetic waves, Propagation, Damping, Fourier analysis.

For abstract, see NSA 21 17.
AEC-TR-6672 HC$3.00 MF$0.65

PROCEEDINGS OF THE 1966 SYMPOSIUM ON ENGINEERING PROBLEMS OF CONTROLLED THERMONUCLEAR RESEARCH HELD OCTOBER 3-6, 1966, IN GATLINBURG, TENNESSEE.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 17.
CONF-661016 HC$3.00 MF$0.65

ANNUAL REPORT, JANUARY 1-DECEMBER 31, 1966.
Princeton Univ., N. J. Plasma Physics Lab.
May 67, 467p
Contract AT (30-1)-1238

Descriptors: (*Thermonuclear reactions, *Plasma medium), (*Plasma physics, Magnetic fields), Electron density, Statistical functions, Electric fields, Cyclotrons, Confinement.

For abstract, see NSA 21 18.
MATT-Q-24 HC$3.00 MF$0.65

INVESTIGATION ON THE COMPRESSION AND THE CONTAINMENT OF A PLASMA IN CUSP GEOMETRY.
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Plasmaphysik.
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 20.
N67-34035 HC$3.00 MF$0.65

LOSS CONE INSTABILITY IN THE STELLARATOR.
United Kingdom Atomic Energy Authority, Culham (England).
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 20.
N67-34445 HC$3.00 MF$0.65

18B. Isotopes

STUDIES OF LOW-ENERGY NUCLEAR REACTIONS AND LEVEL DENSITIES FOR MEDIUM-MASS NUCLEI,
Argonne National Lab., Ill.
Anastasios A. Katsanos. Jan 67, 100p
Contract W-31-109-eng-38

Descriptors: (*Nuclei, *Mass number), (*Nuclear reactions, *Excitation), Kinetic energy, Spin, Density, Nuclear energy levels.

For abstract, see NSA 21 18.
ANL-7289 HC$3.00 MF$0.65

THE DENSIFICATION AND ENCAPSULATION OF ISOTOPIC FUELS BY HIGH ENERGY PNEUMATIC IMPACTION.
Final rept.,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
C. Berglund, V. L. Hammond, and B. M. Johnson. Jun 67, 74p
Contract AT (45-1)-1830

Descriptors: (*Reactor cores, Density), (*Reactor fuels, *Radioactive isotopes), Encapsulation, Reactor feasibility studies, Particle size.

For abstract, see NSA 21 18.
BNWL-381 HC$3.00 MF$0.65

ISOTOPE SYSTEMS DEVELOPMENT PROGRAM. EIGHTH ANNUAL CONTRACTORS MEETING, DECEMBER 5-7, 1966.
Division of Isotopes Development (AEC), Washington, D. C.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 18.
CONF-661203 HC$3.00 MF$0.65

CONFERENCE ON RADIATION PRESERVATION OF FOOD, OAK RIDGE, TENNESSEE, FEBRUARY 2-3, 1967.
Southern Interstate Nuclear Board, Atlanta, Ga.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 17.
CONF-670202 HC$3.00 MF$0.65

FEASIBILITY OF ISOTOPIC X-RAY SOURCES FOR PORTABLE STRESS ANALYSIS EQUIPMENT,
IIT Research Inst., Chicago, Ill.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 18.
COO-578P28-10 HC$3.00 MF$0.65

SAVANNAH RIVER LABORATORY ISOTOPIC POWER AND HEAT SOURCES. PART I.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 10B.
For abstract, see NSA 21 17.
DP-1105-1 HC$3.00 MF$0.65

ANNUAL REPORT OF THE ANALYTICAL CHEMISTRY BRANCH FOR 1966.
Idaho Nuclear Corp., Idaho Falls.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
IN-1063 HC$3.00 MF$0.65

PRELIMINARY STUDIES OF DELAYED NEUTRON EMISSION FROM SEPARATED ISOTOPES OF GASEOUS FISSION PRODUCTS,
Ames Lab., Iowa.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 18.
IS-1567 HC$3.00 MF$0.65

REMOVAL OF IMPURITIES FROM URANIUM HEXAFLUORIDE BY SELECTIVE SORPTION TECHNIQUES.
Progress rept. for 1966,
Oak Ridge Gaseous Diffusion Plant, Tenn.
M. J. Stephenson, J. R. Merriman, and H. L. Kaufman. 17 Jul 67, 55p
Contract W-7405-eng-26

Descriptors: (*Uranium compounds, *Fluorides), (*Impurities, Sorption), Costs, Pellets, Gaseous diffusion separation.

For abstract, see NSA 21 18.
K-1713 HC$3.00 MF$0.65

STABLE GASEOUS ISOTOPE SEPARATION AND PURIFICATION OCTOBER-DECEMBER 1966.
Mound Lab., Miamisburg, Ohio.
31 Dec 66, 30p
Contract AT (33-1)-GEN-53

Descriptors: (*Gaseous diffusion separation, *Neon), (*Xenon, *Thermal diffusion), Purification, Transport properties.

For abstract, see NSA 21 17.
MLM-1390 HC$3.00 MF$0.65

SNAP-23A PROGRAM. PHASE I. ADVANCED TERRESTRIAL RADIOISOTOPE POWER SYSTEMS CONVERTER DEVELOPMENT PROGRAM.
Quarterly rept. no 1, 1 Feb-31 Mar 67,
Minnesota Mining and Mfg. Co., St. Paul. Isotope Power Lab.
H. F. Schwarz. 22 May 67, 182p
Contract AT (30-1)-3824

Descriptors: (*Auxiliary power plants, *Radioactive isotopes), (*Power supplies, *Thermoelectricity), Energy conversion, Quality control.

For abstract, see NSA 21 18.
MMM-3824-0006 HC$3.00 MF$0.65

ANALYTICAL COORDINATION CHEMISTRY: TITRIMETRY, GRAVIMETRY, FLAME PHOTOMETRY, SPECTROMETRY, GAS EVOLUTION AND ISOTOPIC PREPARATIONS, JULY 1965 TO JUNE 1966.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7B.
NBS-TN-402 HC$0.50 MF$0.65

THE DETERMINATION OF STRONTIUM 90 IN ENVIRONMENT MATERIALS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 05 20.
N67-34081 HC$3.00 MF$0.65

A FIVE YEAR PROGRAMME FOR RADIOISOTOPE PRODUCTION AT THE RESEARCH ESTABLISHMENT.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
R. E. Boyd, U. Engelbert, J. N. Gregory, and G. L. Miles. Nov 66, 20p AAEC/TM360

Descriptors: *Facility, *Personnel, *Radioactive isotope, Biology, Estimate, Isotope, Medicine, Production, Radioactivity.

For abstract, see STAR 05 20.
N67-34291 HC$3.00 MF$0.65

ELECTROMAGNETIC SEPARATION AND CHEMICAL REFINEMENT OF LEAD ISOTOPES, SERIES LU,
Oak Ridge National Lab., Tenn.
J. L. Jordan, J. A. Kinnane, and C. W. Sheridan. Jul 67, 25p
Contract W-7405-eng-26

Descriptors: (*Lead, *Isotope separation), (*Refining (Metallurgy), *Ion sources), Ion beams, Ionic current, Recovery, Chlorination.

For abstract, see NSA 21 17.
ORNL-4107 HC$3.00 MF$0.65

ELECTROMAGNETIC SEPARATION AND CHEMICAL REFINEMENT OF CERIUM ISOTOPES,
Oak Ridge National Lab., Tenn.
W. K. Henderson, W. A. Bell, C. R. Croft, and L. O. Love. Jul 67, 25p
Contract W-7405-eng-26

Descriptors: (*Cerium, *Isotope separation), (*Refining (Metallurgy), *Electromagnetism), Purification, Chlorides, Ion sources, Chemical precipitation, Radioactivity.

For abstract, see NSA 21 17.
ORNL-4127 HC$3.00 MF$0.65

RADIOISOTOPE FLOW MEASUREMENTS ON THE FRIANT-KERN CANAL CENTRAL VALLEY PROJECT FRESNO, CALIFORNIA,
Bureau of Reclamation, Denver, Colo. Chemical Engineering Branch.
Robert L. Hansen. 15 Jun 67, 31p ChE-41

Descriptors: (*Radioactive isotopes, Measurement), Inland waterways, Meters, Jet engine valves, Sampling, Calibration, Scintillation counters, Accuracy, California.

Radioisotope discharge measurements were performed on 2 sections of the Friant-Kern Canal during the period August 10-14, 1964, for the purpose of determining the water losses in the canal. A concrete-lined section between Friant Dam and Mile 29 and an earth-lined section between Mile 35 and Mile 53 served as the test reaches. Eight radioisotope injections were made, resulting in 24 individual discharge rate determinations. The discharge values obtained with the radioisotope measurements ranged from 2643 to 3128 cfs and were compared to the results of current meter measurements and the indicated discharge from the calibrated hollow-jet valves at Friant Dam. Measurement accuracies based on the above comparison were all within 9.5%, but many were within 2%. The integrated sample and pulse or 'total count' methods were used to determine the discharge with radioisotopes. A waterproof scintillation counter and 2 GM counters were used in the tests. New methods of field calibration of the immersed counter were tested successfully to calibrate the scintillation counter. (Author)
PB-175 675 HC$3.00 MF$0.65

INVESTIGATION TO DETERMINE THE COMMERCIAL FEASIBILITY AND PRACTICALITY OF THE COMBINED ANION-CATION FIXED RESIN BED SYSTEM FOR THE REMOVAL OF RADIONUCLIDES FROM MILK.
Producers Creamery Co., Springfield, Mo.
For primary bibliographic entry see Field 6H.
PB-175 709 HC$3.00 MF$0.65

TANTALUM FAST-NEUTRON INTEGRATOR,
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 17.
UCRL-17051 HC$3.00 MF$0.65

18C. Nuclear Explosions

COMPUTER ANALYSIS OF PROTECTIVE STRUCTURES FOR PROTECTION FROM NUCLEAR BLAST.
Lin (T Y) and Associates Van Nuys Calif
For primary bibliographic entry see Field 19D.
AD-657 612 HC$3.00 MF$0.65

GEOLOGIC AND ENGINEERING PROPERTIES INVESTIGATIONS.
Final rept.,
Army Engineer Waterways Experiment Station Vicksburg Miss
R. J. Lutton, F. E. Gircuky, and R. W. Hunt. Mar 67, 216p
AEC-PNE-505-F
Rept. on Proj. PRE-SCHOONER, Nevada Test Site, Feb 1964.

Descriptors: (*Rock (Geology), *Basalt), (*Nuclear explosions, *Cratering), Poissons ratio, Stratigraphy, Anisotropy, Fracture (Mechanics), Blast, Terrain, Particle size, Drilling, Site selection, Grain size, Density, Porosity, Physical properties, Elasticity.
Identifiers: Pre-schooner project.

The four Pre-Schooner high explosive cratering experiments were conducted in dry basalt on Bulkboard Mesa, Nevada Test Site. The preshot and postshot conditions were investigated by core boring, borehole photography, geophysical techniques, aerial photography, and exploratory excavations. Representative core samples were tested in the laboratory for strength properties and specific gravity. The rock consists of vesicular basalt over dense basalt, and each type is structurally modified by layering of vesicles resulting from viscous flow of the lava. Natural flow structure within the lava at the sites consists of flow-layered basalt types arranged as nested cylinders with gradational contacts. The axes of these cylinders parallel the flow direction inferred from topography. Cross folds are superimposed on the cylindrical structure. Joints and blast fractures tend to be parallel or perpendicular to flow layers, and as a result an anisotropy due to flow structure prevails at each site. This anistropy appears to explain the conspicuously elliptical form at two of the craters. In the two craters that were explored by trenching, the displaced ground surface was uplifted about 5 feet at the true crater. In the subsurface beyond the true crater at the Delta Site, zones of blast fracturing and bulking have been distinguished. These appear to be modified somewhat by the stratigraphy of the basalt. The limits of fracturing and bulking by the blast appear to lie at about 100 feet from the zero point. (Author)
AD-657 638 HC$3.00 MF$0.65

AIR-BORNE RADIOACTIVITY IN FALLOUT AREAS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 18.
UCLA-12-628 HC$3.00 MF$0.65

18D. Nuclear Instrumentation

THE STATISTICS OF DIGITAL STABILIZERS,
Naval Radiological Defense Lab San Francisco Calif
James M. Ferguson. 18 Jul 67, 45p Rept no. USNRDL-TR-67-82

Descriptors: (*Pulse height analyzers, Stabilization systems), Digital systems, Gain, Nuclear radiation spectrometers, Statistical analysis, Counting methods.

Many pulse-height analysis systems include devices which continually readjust the gain of the system on the basis of digital information recorded in the pulse-height analyzer. The gain of such a system fluctuates because of the counting statistics. This effect is studied as a function of the parameters of the stabilizing system, and in comparison with the ability of the system to compensate for electronic drift. (Author)
AD-657 841 HC$3.00 MF$0.65

ENERGY LOSS AND STRAGGLING OF HIGH ENERGY MUONS IN NaI (Tl),
Stanford Univ Calif High Energy Physics Lab
For primary bibliographic entry see Field 20H.
AD-657 930 Not available from CFSTI.

THE RELATIONSHIP BETWEEN THE RADIOBIOLOGICAL EFFECTS TABLE AND TACTICAL MILITARY RADIATION MEASUREMENT SYSTEM DESIGN,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6S.
AD-657 932 HC$3.00 MF$0.65

CHARGED PARTICLE TRACKS IN POLYMERS NO. 4: CRITERION FOR TRACK REGISTRATION,
Naval Radiological Defense Lab San Francisco Calif
Eugene V. Benton. 10 Jul 67, 33p Rept no. USNRDL-TR-67-80
See also AD-644 273.

Descriptors: (*Dosimeters, *Polymers), (*Particle trajectories, Measurement), Charged particles, Cosmic rays, Radiation measurement systems, Radiation damage, Nitrocellulose, Polyester plastics, Ionization.

A new criterion for track registration in polymer charged particle detectors is proposed. Based on the concept of the restricted energy loss rate, it indicates that only energy transfer collisions of 1.0 plus or minus 0.2 keV and less are important in track formation. For track registration in cellulose nitrate and Lexan, a charged particle must have a restricted energy loss rate of 1.1 and 3700 MeV sq cm/g respectively. This threshold appears to be sharp in both materials. (Author)
AD-658 325 HC$3.00 MF$0.65

TARGETS OF EFFICIENT NEUTRON GENERATORS,
Naval Scientific and Technical Information Centre London (England)
For primary bibliographic entry see Field 20G.
AD-658 346 HC$3.00 MF$0.65

ISOTOPE SYSTEMS DEVELOPMENT PROGRAM. EIGHTH ANNUAL CONTRACTORS MEETING, DECEMBER 5-7, 1966.
Division of Isotopes Development (AEC), Washington, D. C.
7 Dec 66, 89p

Descriptors: (*Nuclear radiation spectrometers, Single crystals), (*Radioactive isotopes, Instrumentation), Bubble chambers, X-ray diffraction analysis, Detectors.

For abstract, see NSA 21 18.
CONF-661203 HC$3.00 MF$0.65

FEASIBILITY OF ISOTOPIC X-RAY SOURCES FOR PORTABLE STRESS ANALYSIS EQUIPMENT,
IIT Research Inst., Chicago, Ill.
R. A. Semmler. Apr 67, 80p
Contract AT (11-1)-578

Descriptors: (*X-ray diffraction analysis, *Special purpose cameras), Collimators, Stresses, Radioactive isotopes.

For abstract, see NSA 21 18.
COO-578P28-10 HC$3.00 MF$0.65

ANNUAL REPORT OF THE ANALYTICAL CHEMISTRY BRANCH FOR 1966.
Idaho Nuclear Corp., Idaho Falls.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
IN-1063 HC$3.00 MF$0.65

SEMICONDUCTOR COUNTING SYSTEM FOR HIGH-RESOLUTION ALPHA-PARTICLE SPECTROSCOPY,
Idaho Nuclear Corp., Idaho Falls.
R. N. Chanda, and R. A. Deal. Jun 67, 16p
Contract AT (10-1)-1230

Descriptors: (*Alpha particle spectroscopy, Accuracy), (*Semiconductors, *Detectors), Spectrum analyzers, Coincidence counting.

For abstract, see NSA 21 17.
IN-1082 HC$3.00 MF$0.65

THERMISTORIZED EBULLIOMETRY SYSTEM FOR DETERMINING MOLECULAR WEIGHTS OF FLUOROCARBONS,
Oak Ridge Gaseous Diffusion Plant, Tenn.
R. D. Rivers, W. O. Gentry, and C. A. Kienberger. 17 Jul 67, 21p
Contract W-7405-eng-26

Descriptors: (*Fluorine compounds, *Carbon), (*Molecular weight, Probes), Thermistors, Freons, Calibration, Solutions, Solvents, Chemical analysis.

For abstract, see NSA 21 18.
K-1690 HC$3.00 MF$0.65

MULTIBULB VISCOMETER,
Oak Ridge National Lab., Tenn.
H. A. Kermicle. 13 Jun 67, 16p
Contract W-7405-eng-26

Descriptors: (*Viscosimeters, Detectors), (*Fiber optics, *Photoconductivity), Interpolation, Instrumentation, Specifications, Errors.

For abstract, see NSA 21 17.
K-1696 HC$3.00 MF$0.65

READING SCHEDULES FOR THE MSA PARTICLE SIZE ANALYZER,
Los Alamos Scientific Lab., N. Mex.
Robert E. Cowan, and Verna L. Gardiner. Mar 67, 64p
Contract W-7405-eng-36

Descriptors: (*Powder metals, *Particle size), Digital computers, Computer programs, Density, Viscosity.

For abstract, see NSA 21 17.
LA-3692 HC$3.00 MF$0.65

CALIBRATION OF TANDEM ANALYZING MAGNET,
Los Alamos Scientific Lab., N. Mex.
Norman H. Magee, Thomas G. Masterson, and Stanley L. Whetstone. Aug 66, 19p
Contract W-7405-eng-36

Descriptors: (*Magnets, Calibration), (*Particle beams, *Inelastic scattering), Nuclear reactions, Nuclear scattering, Least squares method, Elastic scattering, Protons.

For abstract, see NSA 21 18.
LA-3699 HC$3.00 MF$0.65

PERSONNEL RADIO-FREQUENCY RADIATION MONITOR,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 18.
LA-3722 HC$3.00 MF$0.65

MOUND LABORATORY QUARTERLY PROGRESS REPORT, JULY-SEPTEMBER 1966.
Mound Lab., Miamisburg, Ohio.
20 Sep 66, 35p
Contract AT (33-1)-GEN-53

Descriptors: (*Polonium, *Half life), (*Uranium, *Radioactive isotopes), (*Thorium, Solvent extraction), Nuclear physics laboratories, Reports.

For abstract, see NSA 21 17.
MLM-1388 HC$3.00 MF$0.65

DESIGN OF IONIZATION SPECTROMETERS USING IRON AND SCINTILLATORS, FOR THE DETECTION OF HADRONS IN THE 100 TO 1000 BEV RANGE,
Tata Inst. of Fundamental Research, Bombay (India).
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 18.
MURA-725 HC$3.00 MF$0.65

MANUAL OF STANDARD PROCEDURES,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
NYO-4700 HC$3.00 MF$0.65

DESIGN OF A PORTABLE INSTRUMENT FOR MEASURING THE RADIOACTIVE CONTAMINATION OF FOODSTUFFS.
Centre D Etude de L Energie Nucleaire, Mol (Belgium).
For primary bibliographic entry see Field 6R.
For abstract, see STAR 05 20.
N67-34090 HC$3.00 MF$0.65

FIRST ADDENDUM TO THE DATA HANDBOOK FOR SENSITIVITY CALCULATIONS IN NEUTRON ACTIVATION ANALYSIS.
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
F. Girardi, G. Guzzi, and J. Pauly. 1966, 28p
EUR-1898.E, ADDEND. I

Descriptors: (*Bismuth, *Handbook, *Isotope, *Neutron activation, Activation, Analysis, Curve, Data, Decay, Flux, Neutron, Reaction, Sensitivity, Table, Time.

For abstract, see STAR 05 20.
N67-34092 HC$3.00 MF$0.65

PROPERTIES OF A WIDE GAP SPARK CHAMBER IN MEASUREMENTS OF DIRECTION.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy).
V. Manno, and R. Visentin. 21 Apr 67, 12p LNF-67/33
Its Nota Interna, No. 364

Descriptors: (*Ionization, *Particle track, *Spark chamber, Angular, Apparatus, Chamber, Direction, Efficiency, Gap, Gas, Measurement, Particle, Property, Shift, Spark, Track, Wide.

For abstract, see STAR 05 20.
N67-34180 HC$3.00 MF$0.65

FULL-ENERGY-PEAK EFFICIENCIES OF THREE GAMMA-RAY DETECTORS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
P. M. Beach, G. L. Hanna, and D. G. Walker. Apr 67, 19p AAEC/TM384

Descriptors: (*Fission product, *Gamma radiation, *Radiation detector, Detector, Efficiency, Fission, Gamma, Germanium, Iodide, Lithium, Product, Radiation, Resolution, Scintillator, Sodium, Spectrometry.

For abstract, see STAR 05 20.
N67-34298 HC$3.00 MF$0.65

AN ANALYSIS OF THE COMMISSIONING TESTS OF THE DELAYED NEUTRON MONITOR ON THE D.M.T.R. BOILING WATER LOOP.
United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
E. W. Etherington. 2 Feb 67, 21p TRG-1416/D/

Descriptors: *Burst, *Fuel element, *Materials testing reactor, *Monitor, *Neutron detector, *Performance characteristics, Boiling, Can, Characteristics, Contamination, Delay, Detector, Element, Fission, Fuel, Loop, Material, Measurement, Neutron, Nitrogen, Performance, Product, Radioactivity, Reactor, Sensitivity, Signal, Test, Uranium, Water.

For abstract, see STAR 05 20.
N67-34428 HC$3.00 MF$0.65

PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3B.
For abstract, see NSA 21 17.
ORNL-4082 HC$3.00 MF$0.65

TANTALUM FAST-NEUTRON INTERGRATOR,
California Univ., Berkeley. Lawrence Radiation Lab.
Alan R. Smith. 5 Aug 66, 16p
Contract W-7405-eng-48

Descriptors: (*Fast neutrons, *Integrators), (*Tantalum, Detectors), Instrumentation, Radiation measurement systems, Calibration.

For abstract, see NSA 21 17.
UCRL-17051 HC$3.00 MF$0.65

POWERED AIR-PURIFYING RESPIRATOR,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
UCRL-50263 HC$3.00 MF$0.65

18E. Nuclear Power Plants

THE JAPANESE CIVILIAN NUCLEAR PROGRAM,
Rand Corp Santa Monica Calif
Victor Gilinsky, and Paul Langer. Aug 67, 56p
Rept no. RM-5366-PR
Contract F44620-67-C-0045

Descriptors: (*Nuclear energy, Japan), Nuclear power plants, Nuclear reactors, Economics, Plutonium, Uranium, Mining engineering.

A description of Japan's rapidly expanding civilian nuclear program. Despite a late start, the Japanese appear determined to build a substantial and, insofar as possible, a self-sufficient nuclear economy. The 1967 Long Range Program submitted to the Government by the Japan Atomic Energy Commission calls for an installed nuclear electric generating capacity of about 6000 Mwe by 1975 and 30,000 to 40,000 Mwe by 1985. It is estimated that Japan will have produced about 3 tons of plutonium by 1975 and about 35 tons by 1985. The Long Range Program places special emphasis on the development of advanced power reactors, especially the fast breeder. (Author)
AD-657 747 HC$3.00 MF$0.65

THE FIRST CORE REPLACEMENT PM-3A NUCLEAR POWER PLANT, McMURDO STATION, ANTARCTICA.
Final rept.,
Nuclear Utility Services Inc Washington D C
Peter D. Arrowsmith. 17 Mar 65, 153p Rept no. NUS-220
Contract DA-44-009-AMC-547 (X)

Descriptors: (*Power reactors, Refueling), (*Nuclear power plants, *Reactor cores), Pressurized water reactors, Reactor fuels, Handling, Installation, Hazards, Reactor shutdown, Control rods, Antarctic regions.
Identifiers: Army reactors (PM-3A).

Replacement of the first core at the PM-3A Nuclear Power Plant began on 21 November 1964, and was completed on 26 December 1964, with the plant reassembled for acceptance testing. The total elapsed time was 35 days. The report discusses the entire refueling operation including unexpected plant modifications which were necessary during this first refueling. Application of the lessons learned and experience gained from this core replacement together with adequate crew training should provide positive assurance of safe and efficient future fuelings of both PM-3A and PM-1. Based on the actual times for fueling operations, it is estimated that a future fueling could be accomplished in 8 days. (Author)
AD-658 233 HC$3.00 MF$0.65

18F. Radiation Shielding and Protection

EXPERIMENTAL GAMMA RAY BACKSCATTERING BY VARIOUS MATERIALS,
Technical Operations, Inc., Burlington, Mass.
M. J. Barrett, and J. Waldman. Jul 64, 38p TO-B-64-68
Contract OCD-OS-62-14

Descriptors: (*Gamma-ray scattering, Distribution), (*Shielding, Gamma-ray scattering), Water, Concrete, Iron, Lead, Backscattering, Albedo, Electromagnetic wave reflections.

The angular distribution of Cobalt-60 gamma radiation backscattered from water, concrete, iron, and lead targets was measured. A collimated beam of radiation was incident at angles of 0 deg, 30 deg, and 60 deg to the target normal. The targets were all of sufficient thickness to simulate infinate thickness for backscattering. Comparison of the results with the semi-empirical formula of Chilton and Huddleston for differentail dose albedo from concrete showed good agreement. (Author)
AD-447 675 HC$3.00

CALCULATED GAMMA-RAY DOSE DISTRIBUTIONS IN A PHANTOM EXPOSED TO FALLOUT AND SIMULATED FALLOUT.
Radiation Research Associates Inc Fort Worth Tex
For primary bibliographic entry see Field 18H.
AD-658 043 HC$3.00 MF$0.65

SHIELDING CALCULATIONS FOR CONCEPTUAL DESIGN OF FFTF SODIUM SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
W. L. Bunch, and R. E. Shaver. Apr 67, 31p
Contract AT (45-1)-1830

Descriptors: (*Reactor shielding calculations, *Reactor coolants), (*Test reactors, *Sodium), Radioactive isotopes.

For abstract, see NSA 21 17.
BNWL-388 HC$3.00 MF$0.65

PLANE ISOTROPIC BUILDUP FACTORS FOR BREMSSTRAHLUNG CALCULATIONS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
M. O. Burrell, and J. W. Watts. Aug 67, 35p
NASA-TN-D-4096

Descriptors: *Bremsstrahlung, *Gamma radiation, *Isotropic medium, *Monte carlo method, Aluminum, Calculation, Configuration, Current, Dose, Energy, Finite, Flux, Gamma, Geometry, Isotropic, Medium, Plane, Radiation, Slab, Spectrum.

For abstract, see STAR 05 20.
N67-34808 HC$3.00 MF$0.65

COMPARISONS OF RESULTS OBTAINED WITH SEVERAL PROTON PENETRATION CODES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 18.
ORNL-RSIC-17 HC$3.00 MF$0.65

ESTIMATES OF PRIMARY AND SECONDARY PARTICLE DOSES BEHIND ALUMINUM AND POLYETHYLENE SLABS DUE TO INCIDENT SOLAR-FLARE AND VAN ALLEN BELT PROTONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 18.
ORNL-RSIC-18 HC$3.00 MF$0.65

18G. Radioactive Wastes and Fission Products

SENSITIVITY ANALYSIS OF THE RADIAL DISTRIBUTION MODEL. SENSITIVITY TO CARRIER MATERIAL, YIELD AND TYPE OF FISSION,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 18H.
AD-658 327 HC$3.00 MF$0.65

CALCULATIONS ON THE COLLISIONAL COALESCENCE OF FISSION-GAS BUBBLES IN SOLID FUELS,
Battelle Memorial Inst., Columbus, Ohio.
Eugene M. Baroody. 13 Jun 67, 55p
Contract W-7405-eng-92

Descriptors: (*Distribution functions, *Reactor fuels), (*Bubbles, Diffusion), Motion, Colloids, Integrals, Helium group gases, Solubility.

For abstract, see NSA 21 17.
BMI-1805 HC$3.00 MF$0.65

RECOVERY OF CESIUM FROM PUREX ALKALINE WASTE WITH A SYNTHETIC ZEOLITE,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
L. A. Bray. Jun 67, 16p
Contract AT (45-1)-1830

Descriptors: (*Cesium, Recovery), (*Sodium, Reduction), Radioactive isotopes, Chemical precipitation.

For abstract, see NSA 21 17.
BNWL-288 HC$3.00 MF$0.65

ANNUAL REPORT OF THE ANALYTICAL CHEMISTRY BRANCH FOR 1966.
Idaho Nuclear Corp., Idaho Falls.
Apr 67, 160p
Contract AT (10-1)-1230

Descriptors: (*Chemical analysis, Reports), (*Reactor fuel plates, *Uranium compounds), Aluminum compounds, Colorimetric analysis, Mercury, Decay schemes, Nickel, Microanalysis, Plutonium, Separation.

For abstract, see NSA 21 17.
IN-1063 HC$3.00 MF$0.65

PRELIMINARY STUDIES OF DELAYED NEUTRON EMISSION FROM SEPARATED ISOTOPES OF GASEOUS FISSION PRODUCTS,

Ames Lab., Iowa.
G. M. Day, A. B. Tucker, and W. L. Talbert, Jr.
May 67, 25p
Conf-670424-1
Contract W-7405-eng-82
Prepared for presentation at IAEA Panel meeting on Delayed Neutrons, Vienna, Austria.

Descriptors: (*Research reactors, *Fission products), (*Isotope separation, *Ion sources), Krypton, Xenon, Radioactive decay, Half life.

For abstract, see NSA 21 18.
IS-1567 HC$3.00 MF$0.65

MANUAL OF STANDARD PROCEDURES,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
John H. Harley. 1957, 540p

Descriptors: (*Radiation measurement systems, Sampling), (*Radioactive fallout, *Radiochemistry), Radioactivity.

For abstract, see NSA 21 17.
NYO-4700 HC$3.00 MF$0.65

FULL-ENERGY-PEAK EFFICIENCIES OF THREE GAMMA-RAY DETECTORS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 18D.
For abstract, see STAR 05 20.
N67-34298 HC$3.00 MF$0.65

INDEXED BIBLIOGRAPHY ON TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ORNL-NSIC-33 HC$3.00 MF$0.65

LABORATORY DEVELOPMENT OF A PROCESS FOR INCORPORATION OF RADIOACTIVE WASTE SOLUTIONS AND SLURRIES IN EMULSIFIED ASPHALT,
Oak Ridge National Lab., Tenn.
H. W. Godbee, R. E. Blanco, and E. J. Frederick.
Jul 67, 44p
Contract W-7405-eng-26

Descriptors: (*Radioactive waste, Solutions), (*Asphalt, *Slurry coating), Disposal, Storage, Mixtures, Boiling point.

For abstract, see NSA 21 17.
ORNL-4003 HC$3.00 MF$0.65

DISTRIBUTION OF COBALT 60, ZINC 65, STRONTIUM 85, AND CESIUM 137 IN A FRESHWATER POND,
National Center for Radiological Health, Rockville, Md.
For primary bibliographic entry see Field 6R.
PB-175 707 HC$3.00 MF$0.65

RESULTS FROM SEDAN POSTSHOT DRILLING,
California Univ., Livermore. Lawrence Radiation Lab.
Spenst M. Hansen. Dec 66, 39p
Contract W-7405-eng-48

Descriptors: (*Nuclear explosions, *Cratering), (*Rock (Geology), *Drilling), Radioactivity, Radiochemistry, Tritium, Radioactive isotopes.

For abstract, see NSA 21 17.
UCRL-50213 HC$3.00 MF$0.65

18H. Radioactivity

PRELIMINARY REPORT ON NUCLEAR RADIATION EFFECTS ON PIEZOELECTRICS.
Technical rept.,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
Robert Kesselman. 6 Jan 63, 16p
PA-TR-3045

Descriptors: (*Nuclear radiation, *Piezoelectric crystals), Circuits, Zirconium compounds, Barium compounds, Titanates, Gamma-neutron reactions, Damage, Capacitance, Military engineering, Dosage, Voltage.

Nuclear radiation has become another environment which the engineer must consider when designing circuitry. Piezoelectrics have important military applications and it is, therefore, necessary to know how they function during and after nuclear radiation. This report summarizes the preliminary data that this Arsenal has obtained on nuclear effects on lead zirconium titanate and barium titanate crystals. These results represent preliminary information on a statistically small number of samples, but certain trends seem evident (e.g., capacitance and charge release decrease under radiation). Further work is planned in order to determine accurately the different effects produced by varying levels of neutron and gamma radiation on PZT as well as the damage mechanisms involved.
AD-466 277 HC$3.00 MF$0.65

DECAY OF 34Ar,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 20H.
AD-657 970 Not available from CFSTI.

THE ENERGY, LIFETIME, AND SPIN OF THE 1611 keV LEVEL IN 37Ar,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 20H.
AD-657 973 Not available from CFSTI.

THROUGH-THICKNESS NOTCH DUCTILITY AND TENSION PROPERTIES AS A FUNCTION OF NEUTRON EXPOSURE TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 11F.
AD-658 019 HC$3.00 MF$0.65

CALCULATED GAMMA-RAY DOSE DISTRIBUTIONS IN A PHANTOM EXPOSED TO FALLOUT AND SIMULATED FALLOUT.
Contract rept.,
Radiation Research Associates Inc Fort Worth Tex
R. L. French, K. W. Tompkins, and C. W. Garrett.
Feb 67, 75p Rept no. RRA-T71
AFRRI-CR67-1
Contract DA-49-146-XZ-479

Descriptors: (*Radioactive fallout, *Radiological dosage), Gamma rays, Monte Carlo method, Photons, Scattering, Energy, Tables.

Gamma-ray depth-dose distributions in a phantom exposed to fallout and to simulated fallout were calculated by the Monte Carlo method. The phantom consisted of a tissue equivalent vertical right cylinder of 60 cm height and 30 cm in diameter. The center of the phantom was 3 ft 8 in. (111.8 cm) above a smooth ground surface uniformly contaminated with 235U fission products. The energy and angle distribution of the gamma rays incident upon the phantom were taken from previous Monte Carlo calculations. The depth-dose distributions were found to be relatively insensitive to fallout age over the period investigated (1 hour to 9 days). The dose rate at the center of the phantom is approximately 65 percent of the free-field dose rate, while that at the lateral surface is approximately 80 percent. Except near the extremities, the dose rate along the vertical axis of the phantom varies at approximately the same rate with height above ground as does the free-field dose rate. Approximately one-half of the dose rate at the center of the phantom is from photons which have suffered previous collisions in the phantom. An additional calculation was performed of the depth-dose distribution within a phantom positioned at the center of a 4 ft diameter by 5 ft deep foxhole located in a 1.12-hr fallout field. The distribution in the horizontal midplane of the phantom was found to be quite similar in shape to the above ground case except for a sharper dropoff of the dose away from the lateral surface. As would be expected, however, the axial distributions is quite different from that found above ground. (Author)
AD-658 043 HC$3.00 MF$0.65

A PROGRAM TO COMPUTE BETA RADIATION DOSAGE. VOLUME I. PROGRAM DESCRIPTION.
Final rept.,
American Research Corp Fullerton Calif
Gale B. Curtis, and Joan S. Petty. 1 Aug 67, 140p
Rept no. ARC-67-48
USNRDL-TRC-67-20-Vol-1
Contract N00228-66-C-0330
See also Volume 2, AD-658 110.

Descriptors: (*Computer programs, *Radiological dosage), Radioactive fallout, Beta particles, Radiation damage, Fission product activity, Dosage, Absorption, Radioactive decay, Tables, Radiation hazards.

American Research Corporation has developed a computer program to calculate beta radiation dosages to tissue incurred from contact with radioactive fallout particles containing mixed fission products. Versions of the Beta Radiation Dosage Program have been prepared for the CDC 3600 and IBM 7094 computers. Flexible input/output procedures provide control over the selection and arrangement of output parameters. Many tables, functions, and parameters, considered input quantities in most programs, have been incorporated into this program. These quantities may be treated as optional inputs where desired, however. Volume I of the report discusses the technical and programming approaches utilized and describes the program in general terms. Volume II contains detailed instructions for the use of the program as well as program listings. (Author)
AD-658 108 HC$3.00 MF$0.65

A PROGRAM TO COMPUTE BETA RADIATION DOSAGE. VOLUME II. USER'S MANUAL AND PROGRAM LISTINGS.
Final rept.,
American Research Corp Fullerton Calif
Joan S. Petty, and Gale B. Curtis. 1 Aug 67, 208p
Rept no. ARC-67-49
USNRDL-TRC-67-20-Vol-2
Contract N00228-66-C-0330
See also Volume 1, AD-658 108.

Descriptors: (*Computer programs, Radiological dosage), Radioactive fallout, Beta particles, Radiation damage, Fission product activity, Dosage, Absorption, Radioactive decay, Tables, Radiation hazards.

American Research Corporation has developed a computer program to calculate beta radiation dosages to tissue incurred from contact with radioactive particles containing mixed fission products. This program is capable of evaluating beta radiation dosages arising from contact with particles originating from a nuclear weapon detonation as well as particles resulting from the destruction of a nuclear propulsion reactor. Versions of the Program to Compute Beta Radiation Dosage have been prepared for the CDC 3600 and IBM 7094

computers. Flexible input/output procedures provide control over the selection and arrangement of output parameters. Many tables, functions, and parameters, considered input quantities in most programs, have been incorporated into this program. These quantities may be treated as optional inputs where desired, however. Volume I of the report discusses the technical and programming approaches utilized and describes the program in general terms. Volume II contains detailed instructions for the use of the program as well as program listings. (Author)
AD-658 110 HC$3.00 MF$0.65

RADIATION EFFECTS IN THERMOELECTRICS. 2. PERMANENT AND QUASI-PERMANENT EFFECTS OF PILE BOMBARDMENT ON SEVERAL COMPOUND SEMICONDUCTORS,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 20L.
AD-658 326 HC$3.00 MF$0.65

SENSITIVITY ANALYSIS OF THE RADIAL DISTRIBUTION MODEL. SENSITIVITY TO CARRIER MATERIAL, YIELD AND TYPE OF FISSION,
Naval Radiological Defense Lab San Francisco Calif
Samuel H. Cassidy, and Glenn R. Crocker. 22 May 67, 85p Rept no. USNRDL-TR-67-70
Contract AT (49-7)-1963

Descriptors: (*Radioactive fallout, Computer programs), (*Fission products, Distribution), Surface burst, Substrates, Particle size, Mathematical models, Sensitivity, Fission, Dose rate, Subroutines, Fission product activity.

A method was previously developed for calculating the distribution of fission-product nuclides among fallout particles as a function of size. Calculations from this Particle Activity Module of radionuclide fractionation in land-surface nuclear bursts were tested for sensitivity to three kinds of input parameter variation: (1) variation in weapon yield, (2) variation in type of fission and (3) difference in solidification temperature of the carrier material (silicate soil or coral). During the calculations a fourth input parameter, particle-size distribution, was unchanged. The calculations show the model to be relatively insensitive to variation in weapon yield and type of fission. The calculations at a solidification temperature appropriate to coral (2887K) indicated that particles smaller than 47 microns in diameter contribute about 70% of the total exposure rate, while the calculations at the silicate soil solidification temperature (1673K) indicate about 60%. The proportions of the 1-hr exposure-rate contributed by volatile, mixed, and refractory fission-product chains are considerably different for the two solidification temperatures. The temperature sensitivity of the model should be investigated in more detail, since there is reason to believe that changes in fractionation behavior which are not apparent at 1 hour after burst might be important at later times. (Author)
AD-658 327 HC$3.00 MF$0.65

NEUTRON IRRADIATION OF PURE METALS AND ALUMINUM-ZINC ALLOYS,
Argonne National Lab., Ill.
James A. Horak. Oct 66, 83p
Contract W-31-109-eng-38

Descriptors: (*Zinc alloys, *Aluminum alloys), (*Nuclear radiation, *Radiation damage).

For abstract, see NSA 21 17.
ANL-7185 HC$3.00 MF$0.65

PHYSICS MEASUREMENTS WITH MODIFIED DILUENT COMPOSITIONS IN TUNGSTEN-BASED, ALUMINUM-REFLECTED FAST REACTORS,
Argonne National Lab., Ill.
W. G. Knapp, and R. C. Doerner. Feb 67, 39p
Contract W-31-109-eng-38

Descriptors: (*Fast reactors, *Reactor cores), (*Tungsten, *Aluminum), Reflection, Critical assemblies.

For abstract, see NSA 21 17.
ANL-7207 HC$3.00 MF$0.65

STUDIES OF LOW-ENERGY NUCLEAR REACTIONS AND LEVEL DENSITIES FOR MEDIUM-MASS NUCLEI,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 18.
ANL-7289 HC$3.00 MF$0.65

PRELIMINARY STUDIES OF DELAYED NEUTRON EMISSION FROM SEPARATED ISOTOPES OF GASEOUS FISSION PRODUCTS,
Ames Lab., Iowa.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 18.
IS-1567 HC$3.00 MF$0.65

PROTECTIVE SHIPPING PACKAGE FOR 5-INCH-DIAMETER UF 6 CYLINDER,
Oak Ridge Gaseous Diffusion Plant, Tenn.
A. J. Mallett, and C. E. Newlon. 14 Jun 67, 33p
Contract W-7405-eng-26

Descriptors: (*Plastics, Reinforcing materials), (*Packing materials, Transportation), Packaging, Uranium, Radioactive isotopes, Fire resistant materials.

For abstract, see NSA 21 17.
K-1716 HC$3.00 MF$0.65

ORGDP FUEL REPROCESSING STUDIES,
Summary progress rept. Jul-Dec 66,
Oak Ridge Gaseous Diffusion Plant, Tenn.
S. H. Smiley, J. H. Pashley, and R. B. Schappel. 12 Jun 67, 75p
Contract W-7405-eng-26

Descriptors: (*Uranium compounds, *Plutonium compounds), (*Reactor fuel processing, Recovery), Purification, Reactor fuels.

For abstract, see NSA 21 17.
K-1717 HC$3.00 MF$0.65

MOUND LABORATORY QUARTERLY PROGRESS REPORT, JULY-SEPTEMBER 1966.
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 17.
MLM-1388 HC$3.00 MF$0.65

RIGID SOLUTION OF THE ENERGY INDEPENDENT NEUTRON TRANSPORT EQUATION FOR A THIN IMBEDDED LAYER.
Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Forschungsreaktoren.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 20.
N67-34254 HC$3.00 MF$0.65

INDEXED BIBLIOGRAPHY ON TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
L. B. Shappert, and R. S. Burns. Jun 67, 150p
Contract W-7405-eng-26
Prepared in cooperation with Battelle Memorial Inst., Columbus, Ohio.

Descriptors: (*Radioactive waste, *Transportation), (*Containers, *Handling), (*Bibliographies, *Indexes), (*Abstracts, Processing).

For abstract, see NSA 21 17.
ORNL-NSIC-33 HC$3.00 MF$0.65

PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3B.
For abstract, see NSA 21 17.
ORNL-4082 HC$3.00 MF$0.65

ELECTRONUCLEAR DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 18.
ORNL-4122 HC$3.00 MF$0.65

CALCULATED CRITICAL RADII OF SPHERES OF 239 PU AND 233 U WITH VARIOUS SPHERICAL REFLECTORS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Donald R. Ferguson, and Donald C. Coonfield. 9 Jun 67, 10p
Contract AT (29-1)-1106

Descriptors: (*Plutonium, Radioactive isotopes), (*Uranium, Reflectors), Spheres, Thickness, Density, Atomic properties, Neutron cross sections, Scattering.

For abstract, see NSA 21 17.
RFP-936 HC$3.00 MF$0.65

EMPIRICAL ANALYSIS OF SPHERICAL AND HEMISPHERICAL ASSEMBLIES OF ENRICHED-URANIUM METAL,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Bruce B. Ernst, C. L. Schuske, and Howard W. King. 9 Jun 67, 4p
Contract AT (29-1)-1106

Descriptors: (*Critical assemblies, Surface area), (*Reactor fuel enrichment, *Curve fitting), Neutron absorption, Density.

For abstract, see NSA 21 18.
RFP-939 HC$3.00 MF$0.65

AIR-BORNE RADIOACTIVITY IN FALLOUT AREAS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
E. M. Romney, and H. M. Mork. Apr 67, 16p
Contract AT-04-1-GEN-12

Descriptors: (*Radioactivity, Airborne), (*Radioactive fallout, *Particle size), Nuclear explosions, Aerosols, Air, Sampling.

For abstract, see NSA 21 18.
UCLA-12-628 HC$3.00 MF$0.65

18I. Reactor Engineering and Operation

THE FIRST CORE REPLACEMENT PM-3A NUCLEAR POWER PLANT, McMURDO STATION, ANTARCTICA.
Nuclear Utility Services Inc Washington D C
For primary bibliographic entry see Field 18E.
AD-658 233 HC$3.00 MF$0.65

PHYSICS MEASUREMENTS WITH MODIFIED DILUENT COMPOSITIONS IN TUNGSTEN-BASED, ALUMINUM-REFLECTED FAST REACTORS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ANL-7207 HC$3.00 MF$0.65

TRANSIENT THERMAL STRESSES IN HEAT-GENERATING PLATES AND HOLLOW CYLINDERS CAUSED BY SUDDEN CHANGES IN ENVIRONMENTAL TEMPERATURE,
Argonne National Lab., Ill.
R. A. Valentin, G. S. Rosenberg, and D. F. Schoeberle. Feb 67, 45p
Contract W-31-109-eng-38

Descriptors: (*Thermal stresses, Metal plates), (*Cylindrical bodies, *Integral transforms), Environment, Temperature.

For abstract, see NSA 21 17.
ANL-7294 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, MAY 1967.
Argonne National Lab., Ill.
30 Jun 67, 139p
Contract W-31-109-eng-38

Descriptors: (*Reactor kinetics, *Reactor shutdown), Fission products, Reactor operation, Reactor fuels, Corrosion.

For abstract, see NSA 21 18.
ANL-7342 HC$3.00 MF$0.65

SETTLED BED FAST REACTOR IN-PILE CAPSULE,
Brookhaven National Lab., Upton, N. Y.
Guyon P. Pancer, and Charles H. Waide. Aug 66, 20p

Descriptors: (*Fast reactors, *Reactor fuels), (*Reactor coolants, *Sodium), Cermets, Carbides.

For abstract, see NSA 21 17.
BNL-998 HC$3.00 MF$0.65

ENGINEERING DEVELOPMENT DEPARTMENT QUARTERLY REPORT, APRIL-JUNE 1966,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
H. Harty, J. M. Batch, and L. T. Pedersen. Apr 67, 76p
Contract AT (45-1)-1830

Descriptors: (*Power reactors, *Reactor fuels), (*Nuclear power plants, *Reactor materials), Nuclear engineering, Reactor lattice parameters, Test reactors.

For abstract, see NSA 21 17.
BNWL-367 HC$3.00 MF$0.65

SHIELDING CALCULATIONS FOR CONCEPTUAL DESIGN OF FFTF SODIUM SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 17.
BNWL-388 HC$3.00 MF$0.65

THE ATR HIGH-TEMPERATURE HELIUM LOOP MODEL DESCRIPTION AND CAPABILITIES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
P. M. Jackson, and R. J. Evans. May 67, 18p
Contract AT (45-1)-1830

Descriptors: (*Heat exchangers, Instrumentation), (*Test reactors, Model tests), Helium, Purification.

For abstract, see NSA 21 17.
BNWL-419 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 1,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
James M. Morgan, Jr., and Melvin W. First. Jan 67, 627p

Descriptors: (*Reactor safety systems, *Reactor operation), (*Radioactivity, *Nuclear physics laboratories), Symposia, Radioactive waste, Radiological contamination.

For abstract, see NSA 21 17.
CONF-660904-Vol-1 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 2,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
James M. Morgan, Jr., and Melvin W. First. Jan 67, 604p

Descriptors: (*Reactor safety systems, *Reactor operation), (*Radioactivity, *Nuclear physics laboratories), Symposia, Radioactive waste, Radiological contamination.

For abstract, see NSA 21 17.
CONF-660904-Vol-2 HC$3.00 MF$0.65

FAILURE ANALYSES AND PROPERTIES OF SAFETY ROD GUIDE TUBES FROM THE HWCTR,
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
R. P. Marshall, and C. L. Selby. Apr 67, 21p
Contract AT (07-2)-1

Descriptors: (*Test reactors, Failure (Mechanics)), (*Cracks, *Nuclear radiation), Stresses, Deceleration, Fracture (Mechanics), Corrosion, Grain size, Ductility.

For abstract, see NSA 21 17.
DP-1077 HC$3.00 MF$0.65

STUDY OF A PRESTRESSED CONCRETE VESSEL FOR A BOILING-WATER REACTOR OF 1000 MWE.
Final rept.
Societe d'Etudes et d'Equipments d'Entreprises, Paris (France).
Sep 66, 262p EUR-3331

Descriptors: (*Boiling water reactors, *Thermal insulation), (*Pressure vessels, Concrete), Stresses, Costs, Optimization.

For abstract, see NSA 21 18.
EURAEC-1789 HC$3.00 MF$0.65

PRESTRESSED CONCRETE REACTOR VESSEL MODEL 1.
General Dynamics Corp., San Diego, Calif. General Atomic Div.
25 Oct 66, 391p
Contract AT (04-3)-167

Descriptors: (*Nuclear power plants, Concrete), (*Reinforcing materials, Stresses), Pressure vessels, Strain gages, Nuclear reactors, Costs.

For abstract, see NSA 21 18.
GA-7097 HC$3.00 MF$0.65

PRESTRESSED CONCRETE REACTOR VESSEL MODEL 2.
General Dynamics Corp., San Diego, Calif. General Atomic Div.
4 Nov 66, 350p
Contract AT (04-3)-633

Descriptors: (*Nuclear power plants, Concrete), (*Reinforcing materials, Stresses), Strain gages.

For abstract, see NSA 21 18.
GA-7150 HC$3.00 MF$0.65

RADIOLOGICAL ASPECTS OF THE SNAP-TRAN-2 DESTRUCTIVE TEST,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
O. L. Cordes, D. F. Bunch, and J. R. Fielding. Feb 67, 51p
Contract AT (10-1)-205

Descriptors: (*Auxiliary power plants, *Reactor safety systems), (*Reactor shutdown, *Radiation monitors), Reactor fuel rods, Reactor cores, Reactor operation, Reactor reactivity, Health physics instrumentation.

For abstract, see NSA 21 18.
IDO-17203 HC$3.00 MF$0.65

LOFT CORE DESIGN REPORT,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
C. S. Miller. Apr 67, 159p
Contract AT (10-1)-205

Descriptors: (*Reactor cores, *Reactor fuel elements), (*Reactor fuel enrichment, *Control rods), Thermal expansion, Reactor operation, Reactor system components.

For abstract, see NSA 21 18.
IDO-17219 HC$3.00 MF$0.65

A REVIEW AND DISCUSSION OF LITERATURE CONCERNING TRANSIENT HEAT TRANSFER AND STEAM FORMATION,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 20M.
For abstract, see NSA 21 17.
IDO-17226 HC$3.00 MF$0.65

TOODEE A TWO-DIMENSIONAL TIME-DEPENDENT HEAT CONDUCTION PROGRAM,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
John A. McClure. Apr 67, 167p
Contract AT (10-1)-205

Descriptors: (*Computer programs, *Programming languages), (*Reactor kinetics, *Reactor fuel elements), Thermal conductivity, Heat transfer coefficients.

For abstract, see NSA 21 18.
IDO-17227 HC$3.00 MF$0.65

FUEL CYCLE COST IMPLICATIONS OF LIQUID PLUTONIUM REACTOR FUEL,

Los Alamos Scientific Lab., N. Mex.
W. H. Hannum. Nov 66, 108p
Contract W-7405-eng-36

Descriptors: (*Reactor fuels, Liquid metals), (*Plutonium, *Costs), Fuel burn up, Heat transfer, Fast reactors, Breeder reactors.

For abstract, see NSA 21 17.
LA-3655 HC$3.00 MF$0.65

FLAME SPRAYING URANIUM OXIDE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
LA-3677 HC$3.00 MF$0.65

ADVANCED REACTOR TECHNOLOGY (ART). PART II.
Quarterly status rept. for period ending 30 Apr 67.
Los Alamos Scientific Lab., N. Mex.
May 67, 18p
Contract W-7405-eng-36

Descriptors: (*Reactor control, Reactor safety systems), (*Reactor fuels, Reactor operation), Reactor coolants, Reactor materials.

For abstract, see NSA 21 17.
LA-3708-Pt-1 HC$3.00 MF$0.65

THERMAL BEHAVIOR OF SNAP 8 REACTOR DURING ATMOSPHERIC REENTRY,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see NSA 21 17.
NAA-SR-12355 HC$3.00 MF$0.65

LIQUID METAL ENGINEERING CENTER (LMEC) QUARTERLY TECHNICAL PROGRESS REPORT, JANUARY-MARCH 1967.
Atomics International, Canoga Park, Calif. Liquid Metal Engineering Center.
5 May 67, 60p
Contract AT (04-3)-700

Descriptors: (*Liquid metals, *Sodium), (*Fast reactors, *Nuclear engineering), Breeder reactors, Standards, Specifications.

For abstract, see NSA 21 18.
NAA-SR-12416 HC$3.00 MF$0.65

BOILING HEAT TRANSFER WITH ELECTRICAL FIELD (EHD).
Atlantic Research Corp., Alexandria, Va.
For primary bibliographic entry see Field 20M.
For abstract, see NSA 21 18.
NYO-2404-76 HC$3.00 MF$0.65

REACTIVITY WORTH OF CONTROL RODS IN THE BERYLLIUM OXIDE MODERATED PEBBLE BED REACTOR.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
N. Spinks. Feb 67, 13p AAEC/TM375

Descriptors: *Beryllium oxide, *Control rod, *Pebble bed reactor experiment (pbre), *Reactor core, Bed, Beryllium, Calculation, Cell, Control, Core, Cylinder, Model, Moderation, Oxide, Pebble, Reactivity, Reactor, Rod, Space, Tube.

For abstract, see STAR 05 20.
N67-34011 HC$3.00 MF$0.65

CANDU-BLW EXPERIMENTS IN ZED-2. PART III - BUCKLING AND LOSS OF COOLANT EXPERIMENTS.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
C. W. Colpitts, R. E. Green, and R. E. Kay. May 67, 45p AECL-2691

Descriptors: *Buckling, *Coolant, *Fuel element, *Reactor technology, Air, Dioxide, Effect, Element, Fuel, Measurement, Reactivity, Reactor, Simulation, Technology, Uranium, Water.

For abstract, see STAR 05 20.
N67-34102 HC$3.00 MF$0.65

STUDY ON BURNOUT HEAT FLUX IN BOILING WATER QUARTERLY REPORT, 1 JAN. - 28 FEB. 1966.
M. A. N. Werk, Augsburg (West Germany).
F. Mayinger, O. Schad, and E. Weiss. Mar 66, 32p EURAEC-1524, QR-18
Contract EURATOM-057-61-RDD

Descriptors: *Boiling water reactor, *Burnout, *Heat flux, *Orifice, *Pipeflow, *Pressurized water reactor, Boiling, Bubble, Channel, Film, Flow, Flux, Formation, Growth, Heat, Hydrodynamics, Internal, Measurement, Nucleate, Pipe, Pressurization, Pulse, Reactor, Stability, Test, Thermodynamic, Water.

For abstract, see STAR 05 20.
N67-34161 HC$3.00 MF$0.65

WORTH OF BORON ROD IN THE REACTOR MOATA.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
N. Spinks. Jun 67, 20p AAEC/E181

Descriptors: *Boron, *Reactor fuel, *Uranium 235, Calculation, Code, Diffusion, Element, Flux, Fuel, Neutron, Reactor, Theory, Transport.

For abstract, see STAR 05 20.
N67-34284 HC$3.00 MF$0.65

ROUGH TUBE FRICTION FACTORS AND HEAT TRANSFER COEFFICIENTS IN LAMINAR AND TRANSITION FLOW.
United Kingdom Atomic Energy Authority, Harwell (England). Chemical Engineering and Process Technology Div.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 20.
N67-34347 HC$3.00 MF$0.65

DESIGN, DEVELOPMENT AND MANUFACTURE OF NEUTRON CONVERTORS FOR D.M.T.R..
United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-34532 HC$3.00 MF$0.65

STUDY ON A GENERAL TECHNICAL SOLUTION FOR A DATA-TRANSMISSION PROBLEM IN A NUCLEAR RESEARCH CENTER.
European Atomic Energy Community, Ispra (Italy). Engineering Dept.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 20.
N67-34638 HC$3.00 MF$0.65

FABRICATION OF ORGANIC LIQUID LOOP NO. 4 FINAL REPORT.
Fabrication de La Boucle A Liquide Organique No. 4 Rapport Final
Commissariat A L Energie Atomique, Grenoble (France). Centre D'etudes Nucleaires.
F. Franzetti, and R. Pointud. May 67, 46p EUR-3456.F
Contract EURATOM-061-62-10 ORGF
in French, English Summary

Descriptors: *France, *Loop, *Reactor technology, Flux, Monitor, Pool, Reactor, Technology.

For abstract, see STAR 05 20.
N67-34811 HC$3.00 MF$0.65

INDEXED BIBLIOGRAPHY ON TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ORNL-NSIC-33 HC$3.00 MF$0.65

DEVELOPMENT OF A MODEL FOR COMPUTING 135 XE MIGRATION IN THE MSRE,
Oak Ridge National Lab., Tenn.
R. J. Kedl, and A. Houtzeel. Jun 67, 78p
Contract W-7405-eng-26

Descriptors: (*Reactor poisons, *Xenon), (*Krypton, *Tracer studies), Reactor cores, Graphite, Mass transfer, Fuel burn up.

For abstract, see NSA 21 17.
ORNL-4069 HC$3.00 MF$0.65

UNDERWATER CAISSON CONTAINMENT OF LARGE POWER REACTORS,
Oak Ridge National Lab., Tenn.
O. H. Klepper, and C. G. Bell. Jun 67, 269p
Contract W-7405-eng-26

Descriptors: (*Power reactors, Reactor feasibility studies), (*Containment, Underwater), Costs, Fission products, Geology, Reactor accidents.

For abstract, see NSA 21 18.
ORNL-4073 HC$3.00 MF$0.65

IRRADIATION BEHAVIOR OF EU203-STAINLESS STEEL DISPERSIONS,
Oak Ridge National Lab., Tenn.
C. F. Leitten, Jr., A. E. Richt, and R. J. Beaver. Jun 67, 45p
Contract W-7405-eng-26

Descriptors: (*Nuclear radiation, *Stainless steel), (*Reactor lattice parameters, Nuclear engineering), Dosimeters.

For abstract, see NSA 21 17.
ORNL-4104 HC$3.00 MF$0.65

RADIATION DOSIMETRY STUDIES AT THE HEALTH PHYSICS RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
ORNL-4113 HC$3.00 MF$0.65

MSRE CONTROL ELEMENTS MANUFACTURE, INSPECTION, DRAWINGS, AND SPECIFICATIONS,
Oak Ridge National Lab., Tenn.
G. M. Tolson, and A. Taboada. Jul 67, 53p
Contract W-7405-eng-26

Descriptors: (*Nuclear reactors, *Control rods), (*Bushings, Manufacturing methods), Specifications, Presses (Machinery), Sintering, Reactor feasibility studies.

For abstract, see NSA 21 17.
ORNL-4123 HC$3.00 MF$0.65

ENGINEERING APPROACH TO MULTIAXIAL PLASTICITY,
Oak Ridge National Lab., Tenn.

J. G. Merkle. Jul 67, 100p
Contract W-7405-eng-26

Descriptors: (*Nuclear power plants, *Nuclear engineering), Shear stresses, Plasticity, Stability, Hydrostatic pressure, Strain (Mechanics), Anisotropy, Tensile properties, Pressure vessels, Containment.

For abstract, see NSA 21 18.
ORNL-4138 HC$3.00 MF$0.65

FUEL ROD TRANSIENT HEAT TRANSFER EXPERIMENTS AND ANALYSIS,
Sandia Corp., Albuquerque, N. Mex.
Joseph B. Rivard, and Roger J. Mattson. Jun 67, 16p

Descriptors: (*Reactor fuel rods, Heat transfer), (*Reactor fuel elements, Cooling), Hydraulic models, Thermodynamics.

For abstract, see NSA 21 17.
SC-RR-67-19 HC$3.00 MF$0.65

NUCLEAR ENERGY FOR WATER DESALTING. A BIBLIOGRAPHY,
Oak Ridge National Lab., Tenn.
Helen F. Kuhns, and Henry D. Raleigh. May 67, 40p
Prepared in cooperation with Division of Technical Information Extension (AEC) Oak Ridge, Tenn.

Descriptors: (*Water supplies, *Desalination), (*Nuclear energy, Bibliographies), Nuclear reactors, Indexes.

For abstract, see NSA 21 17.
TID-3584-Rev-1 HC$3.00 MF$0.65

DIFFUSION-THEORY DEPLETION ANALYSIS OF THE YANKEE CORE,
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
R. G. Lacey, and R. E. Radcliffe. 1966, 124p
Contract AT (30-1)-3017

Descriptors: (*Reactor cores, *Reactor fuels), (*Fuel burn up, *Neutron transport theory), Reactor reactivity, Fission product poisoning.

For abstract, see NSA 21 18.
WCAP-6077 HC$3.00 MF$0.65

18J. Reactor Materials

THE JAPANESE CIVILIAN NUCLEAR PROGRAM,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 18E.
AD-657 747 HC$3.00 MF$0.65

THROUGH-THICKNESS NOTCH DUCTILITY AND TENSION PROPERTIES AS A FUNCTION OF NEUTRON EXPOSURE TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 11F.
AD-658 019 HC$3.00 MF$0.65

PHYSICS MEASUREMENTS WITH MODIFIED DILUENT COMPOSITIONS IN TUNGSTEN-BASED, ALUMINUM-REFLECTED FAST REACTORS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ANL-7207 HC$3.00 MF$0.65

CORROSION OF ALUMINUM ALLOYS BY FLOWING HIGH-TEMPERATURE WATER,
Argonne National Lab., Ill.
J. E. Draley, and W. E. Ruther. Jan 67, 20p
Contract W-31-109-eng-38

Descriptors: (*Aluminum alloys, *Corrosion), (*Corrosion inhibition, *Corrosion resistance).

For abstract, see NSA 21 17.
ANL-7227 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, MAY 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
ANL-7342 HC$3.00 MF$0.65

GEL-ADDITION PROCESS CHEMICAL STUDIES.
Quarterly progress rept. no. 3, Jul-Sep 66,
Babcock and Wilcox Co., Lynchburg, Va. Research and Development Div.
E. C. Moncrief. May 67, 39p
Contract AT (30-1)-3715

Descriptors: (*Reactor fuels, *Gels), Oxides, Preparation, Uranium compounds, Plutonium compounds, Solutions, Attrition.

For abstract, see NSA 21 17.
BAW-3714-3 HC$3.00 MF$0.65

PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JANUARY-MARCH 1967,
Battelle Memorial Inst., Columbus, Ohio.
Donald L. Keller. 1 Apr 67, 98p
Contract W-7405-eng (92

Descriptors: (*Reactor fuels, *Reactor fuel cladding), (*Reactor lattice parameters, *Fast reactors), Breeder reactors.

For abstract, see NSA 21 18.
BMI-1798 HC$3.00 MF$0.65

CALCULATIONS ON THE COLLISIONAL COALESCENCE OF FISSION-GAS BUBBLES IN SOLID FUELS,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 17.
BMI-1805 HC$3.00 MF$0.65

SETTLED BED FAST REACTOR IN-PILE CAPSULE,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
BNL-998 HC$3.00 MF$0.65

METALLOGRAPHIC EVIDENCE OF STRAIN- AND IRRADIATION-INDUCED PRECIPITATION IN PRECONDITIONED HASTELLOY X-280,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
I. S. Levy, and K. R. Wheeler. Apr 66, 13p
Contract AT (45-1)-1830

Descriptors: (*Nickel alloys, *Reactor materials), (*Nuclear radiation, *Radiation damage), Metallography, Heat treatment, Strain (Mechanics), Microstructure.

For abstract, see NSA 21 18.
BNWL-211 HC$3.00 MF$0.65

ENGINEERING DEVELOPMENT DEPARTMENT QUARTERLY REPORT, APRIL-JUNE 1966,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
BNWL-367 HC$3.00 MF$0.65

CHEMICAL THINNING OF PNEUMATICALLY IMPACTED UO2 FOR ELECTRON TRANSMISSION MICROSCOPY,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
M. P. Bauleke. May 67, 11p
Contract AT (45-1)-1830

Descriptors: (*Uranium compounds, Oxides), (*Crystal lattice defects, *Grain boundaries), Electron microscopy.

For abstract, see NSA 21 17.
BNWL-416 HC$3.00 MF$0.65

CONVECTION HEAT TRANSFER IN MOLTEN CENTER OXIDE FUELS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
J. A. Christensen. Jun 67, 28p
Contract AT (45-1)-1830

Descriptors: (*Reactor cores, *Neutron flux), (*Reactor fuel rods, Heat transfer), Thermal conductivity, Convection (Heat transfer), Liquid metals, Uranium compounds, Dioxides.

For abstract, see NSA 21 18.
BNWL-418 HC$3.00 MF$0.65

REACTIONS OF SELECTED METAL-METAL COUPLES AT 1100 DEGREES C,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 18.
BNWL-421 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 1,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
CONF-660904-Vol-1 HC$3.00 MF$0.65

PROCEEDINGS OF THE AEC AIR CLEANING CONFERENCE (9th) HELD IN BOSTON, MASSACHUSETTS, SEPTEMBER 13-16, 1966. VOLUME 2,
Harvard Univ., Boston, Mass. Air Cleaning Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
CONF-660904-Vol-2 HC$3.00 MF$0.65

LOFT CORE DESIGN REPORT,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
IDO-17219 HC$3.00 MF$0.65

TOODEE A TWO-DIMENSIONAL TIME-DEPENDENT HEAT CONDUCTION PROGRAM,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.

For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
IDO-17227 HC$3.00 MF$0.65

SPECTROCHEMICAL DETERMINATION OF IMPURITIES IN TUNGSTEN,
Oak Ridge Gaseous Diffusion Plant, Tenn.
R. B. Farrar, D. C. S. Randolf, and H. H. Sullivan.
5 Jul 67, 41p
Contract W-7405-eng-26

Descriptors: (*Tungsten, *Impurities), Distillation, Separation, Reduction, Chemical precipitation, Powder metals.

For abstract, see NSA 21 17.
K-1683 HC$3.00 MF$0.65

ORGDP FUEL REPROCESSING STUDIES,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
K-1717 HC$3.00 MF$0.65

BEHAVIOR OF LIQUID Pu-Co-Ce ALLOYS IN CONTACT WITH SODIUM. II. LIQUID METAL EQUILIBRIA,
Los Alamos Scientific Lab., N. Mex.
J. C. Clifford. 15 Apr 67, 10p
Contract W-7405-eng-36

Descriptors: (*Cerium, *Sodium), (*Cobalt, *Plutonium), Fast reactors, Reactor coolants, Reactor cores, Liquid metals, Chemical analysis, Metallography.

For abstract, see NSA 21 18.
LA-3545 HC$3.00 MF$0.65

FUEL CYCLE COST IMPLICATIONS OF LIQUID PLUTONIUM REACTOR FUEL,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
LA-3655 HC$3.00 MF$0.65

PREPARATION OF HIGH DENSITY GRAPHITE BY HYDROSTATIC PRESSING,
Los Alamos Scientific Lab., N. Mex.
D. H. Schell, and L. A. Wertz. 8 Dec 66, 16p
Contract W-7405-eng-36

Descriptors: (*Graphite, Density), (*Hydrostatic pressure, Preparation), Thermosetting plastics, Chemical analysis, Extrusion.

For abstract, see NSA 21 17.
LA-3664 HC$3.00 MF$0.65

ADVANCED REACTOR TECHNOLOGY (ART). PART II.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
LA-3708-Pt-1 HC$3.00 MF$0.65

LIQUID METAL ENGINEERING CENTER (LMEC) QUARTERLY TECHNICAL PROGRESS REPORT, JANUARY-MARCH 1967.
Atomics International, Canoga Park, Calif. Liquid Metal Engineering Center.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
NAA-SR-12416 HC$3.00 MF$0.65

ANALYSIS OF REACTOR FUEL ELEMENT SOLUTIONS. I. SEPARATIONS AND PREPARATION OF SAMPLES FOR MASS SPECTROMETRY AND ALPHA SPECTROMETRY. II. MASS SPECTROMETRIC DETERMINATION OF URANIUM AND PLUTONIUM CONCENTRATION AND ISOTOPIC COMPOSITION. III. ALPHA SPECTROMETRIC DETERMINATION OF PLUTONIUM 238,
New Brunswick Lab. (AEC), N. J.
For primary bibliographic entry see Field 7D.
For abstract, see NSA 21 17.
NBL-238 HC$3.00 MF$0.65

THE PREPARATION OF PLUTONIUM CONTAINING SAMPLES FOR ELECTRON PROBE MICROANALYSIS.
United Kingdom Atomic Energy Authority, Harwell (England). Ceramics Div.
H. E. Chamberlain, and D. J. Hodkin. May 67, 10p AERE-M-1889

Descriptors: *Decontamination, *Electron probe, *Metallography, *Microanalysis, *Plutonium, Diagram, Electron, Geometry, Mounting, Preparation, Probe, Requirement, Sample, Surface.

For abstract, see STAR 05 20.
N67-34098 HC$3.00 MF$0.65

THE EMISSION SPECTROCHEMICAL ANALYSIS OF IMPURITIES IN PLUTONIUM DIOXIDE.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 05 20.
N67-34327 HC$3.00 MF$0.65

TEMPERATURES AND THERMO-ELASTIC STRESS IN SPHERICALLY SYMMETRIC FUEL ELEMENTS WITH VARYING MATERIAL PROPERTIES.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
I. M. Binns. Feb 67, 26p AAEC/TM371

Descriptors: *Fuel element, *Stress analysis, *Temperature effect, *Thermoelasticity, Analysis, Bed, Beryllium, Effect, Element, Fuel, Material, Moderation, Pebble, Property, Reactor, Sphere, Stress, Temperature.

For abstract, see STAR 05 20.
N67-34328 HC$3.00 MF$0.65

PROCESSING IN LIMITED GEOMETRY, PART 15 - A DEMONSTRATION OF PHYSICAL MIXING FOR OXIDE FUELS.
United Kingdom Atomic Energy Authority, Harwell (England). Chemical Engineering and Process Technology Div.
K. R. Poole, and G. P. Wall. Apr 67, 14p AERE-M-1884

Descriptors: *Ceramic fuel, *Metal oxide, *Mixer, Ceramic, Fuel, Homogeneity, Metal, Mixing, Mixture, Oxide, Plutonium, Powder, Thorium, Uranium.

For abstract, see STAR 05 20.
N67-34329 HC$3.00 MF$0.65

DETERMINATION OF OXYGEN IN FLUORIDES AND REFRACTORIES BY INERT GAS FUSION.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
For primary bibliographic entry see Field 7A.
For abstract, see STAR 05 20.
N67-34341 HC$3.00 MF$0.65

MEASUREMENT OF THE FLUX DENSITY AND DOSE RATE EQUIVALENT REMOVAL CROSS SECTIONS OF VARIOUS ATTENUATION MATERIALS FOR NEUTRONS.
Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Strahlenschutz.
For primary bibliographic entry see Field 18K.
For abstract, see STAR 05 20.
N67-34360 HC$3.00 MF$0.65

THE EFFICIENCY OF THE ABSORBERS IN THE LATINA REACTOR.
l'Efficacia Degli Assorbitori Nel Reattore Di Latina
G. Giannini, M. P. Gualandi, G. Lesnoni, and B. Zaffiro. Jun 67, 58p EUR-3487.I
Contract EURATOM-050-65-1 TEGI
in Italian, English Summary

Descriptors: *Absorber, *Reactor core, Channel, Core, Efficiency, Irradiation, Reactivity, Reactor, Theory.

For abstract, see STAR 05 20.
N67-34366 HC$3.00 MF$0.65

CONTACT DIFFUSION INTERACTION OF MATERIALS WITH CLADDING.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. 19 May 67, 42p NASA-TM-X-60158, RSIC-676
Center, 19 May 1967 42 P Refs Transl. Into English From Proc. of the Symp. on Thermodyn. With Emphasis on Nucl. Mater. and Atomic Transport in Solids, V. 2, 1966 P 153-180 Symp. Held in Vienna, 22-27 Jul. 1965 Jointly Supported By Army Missile Command

Descriptors: *Cladding, *Conference, *Diffusion, *Thermodynamics, Carbon, Condensation, Molybdenum, Nuclear, Solid, Transport property, Tungsten, Uranium, Zirconium carbide.

For abstract, see STAR 05 20.
N67-34374 HC$3.00 MF$0.65

THE SEPARATION OF NEODYMIUM FOR THE DETERMINATION OF THE BURN-UP OF NUCLEAR FUELS.
United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
J. L. Drummond, and D. J. Savage. 1967, 12p
TRG-1496/D/

Descriptors: *Chromatography, *Fission product, *Mass spectrometry, *Neodymium, *Nuclear fuel, Anion, Dilution, Exchange, Fission, Fuel, Irradiation, Isotope, Mass, Nuclear, Procedure, Product, Radioactivity, Separation, Spectrometry.

For abstract, see STAR 05 20.
N67-34383 HC$3.00 MF$0.65

CONTRIBUTION TO THE STUDY OF HYDROGENATED AND OXYGENATED IMPURITIES IN LIQUID SODIUM.
United Kingdom Atomic Energy Authority, Risley (England). Reactor Group.
G. Naud. 1966, 50p TRG-552/C/, CEA-2583
Transl. Into English of Cea-2583

Descriptors: *Cooling system, *Fast reactor, *Hydrogen compound, *Liquid sodium, *Metal corrosion, Analysis, Bibliography, Chemical, Cooling, Corrosion, Decomposition, Environment, Fast, Glass, High temperature, Hydride, Hydrogenation, Hydroxide, Impurity, Kinetics, Liquid, Metal, Method, Oxide, Oxygen, Oxygenation, Pyrex, Reaction, Reactor, Sodium, System, Thermal.

For abstract, see STAR 05 20.
N67-34486 HC$3.00 MF$0.65

DESIGN, DEVELOPMENT AND MANUFACTURE OF NEUTRON CONVERTORS FOR D.M.T.R.

United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
W. R. Lorimer, and T. G. Pearson. 1967, 24p
TRG-1453/D/

Descriptors: *Converter, *Materials testing reactor, *Neutron flux, *Reactor design, Design, Development, Flux, Fuel, Manufacture, Material, Neutron, Plate, Reactor, Rig, Testing.

For abstract, see STAR 05 20.
N67-34532 HC$3.00 MF$0.65

INFLUENCE OF NEUTRON IRRADIATION ON THE MECHANICAL PROPERTIES AND THE CORROSION BEHAVIOR OF ZR NB3 SN1 AND ZIRCALOY-2.
Metallgesellschaft, A. G., Frankfurt Am Main (West Germany).
H. Richter, W. Ruckdeschel, W. Spalthoff, and E. Starke. May 67, 37p EUR-3335.E, EURAEC-1795
Contract EURATOM-092-62-7 RDD
Presented At the Intern. Conf. on the Use of Zirconium Alloys in Nucl. Reactors, Pilsen, Czechoslovakia, 20-21 Oct. 1966

Descriptors: *Mechanical property, *Metal corrosion, *Neutron bombardment, *Zirconium alloy, Alloy, Annealing, Bombardment, Corrosion, Fast, Flux, Hydrogen, Impact, Mechanical, Metal, Neutron, Niobium, Property, Tensile, Tin, Zircaloy 2, Zirconium.

For abstract, see STAR 05 20.
N67-34696 HC$3.00 MF$0.65

FOURTEEN C/D,N/15 N AND 15 N/D,N/16 O REACTIONS.
European Atomic Energy Community, Geel (Belgium).
M. Coppola, and H.-H. Knitter. Jun 67, 22p
EUR-3492.E

Descriptors: *Neutron source, *Nuclear reaction, Carbon, Cross section, Deuteron, Energy, Excitation, Ground, Neutron, Nitrogen, Nuclear, Oxygen, Physics, Reaction, Spectrum.

For abstract, see STAR 05 20.
N67-35002 HC$3.00 MF$0.65

THE DEVELOPMENT OF TEXTURE IN ZIRCONIUM ALLOY TUBES AND ITS EFFECT ON MECHANICAL PROPERTIES.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
B. A. Cheadle. Mar 67, 21p AECL-2698

Descriptors: *Manufacturing, *Pipe, *Zirconium alloy, Alloy, Control, Development, Ductility, Flow, Fuel, Grain, Orientation, Reactor, Strength, Texture, Tube, Zirconium.

For abstract, see STAR 05 20.
N67-35138 HC$3.00 MF$0.65

THE EFFECT OF NEUTRON IRRADIATION ON THE HIGH TEMPERATURE TENSILE PROPERTIES OF SOME NICKEL-CONTAINING ALLOYS.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-35256 HC$3.00 MF$0.65

SURFACE TREATMENT OF ZIRCONIUM ALLOYS BY OXIDIZING FUSED SALTS.
Traitement de Surface D'alliages de Zircon- Ium Par les Sels Fondus Oxydants
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
A. Avogadro, C. Hardy-grena, and J.-G. Wurm. May 67, 36p EUR-3476.F
in Italian, English Summary

Descriptors: *Oxidation, *Salt, *Surface treatment, *Zirconium alloy, Alloy, Chlorine, Coating, Fusion, Nitrogen, Oxygen, Sodium, Surface, Treatment, Zirconium.

For abstract, see STAR 05 20.
N67-35272 HC$3.00 MF$0.65

VOID FRACTION MEASUREMENTS IN A TWO-PHASE FLOW NA K/ARGON.
Mesure de La Fraction de Vide Dans Un Ecoulement Double Phase Nak-argon
European Atomic Energy Community, Ispra (Italy).
J. Lazarus, B. Milliot, and J.-PH. Navarre. Jun 67, 68p EUR-3486.F
in Italian, English Summary

Descriptors: *Argon, *Potassium, *Sodium, *Two-phase flow, *Void fraction, Electric resistance, Emulsion, Flow, Fraction, Gamma ray beam, Phase, Pressure drop, Two, Vertical, Void.

For abstract, see STAR 05 20.
N67-35279 HC$3.00 MF$0.65

INDEXED BIBLIOGRAPHY ON TRANSPORTATION AND HANDLING OF RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 17.
ORNL-NSIC-33 HC$3.00 MF$0.65

FABRICATION OF REBUILT BONUS REACTOR SUPERHEATER FUEL ASSEMBLY,
Oak Ridge National Lab., Tenn.
G. M. Slaughter, E. A. Franco-Ferreira, E. C. Kirstowsky, and G. M. Tolson. Jun 67, 163p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel rods, *Reactor fuel cladding), (*Performance (Engineering), *Grain size), Brazing, Chemical analysis, Specifications.

For abstract, see NSA 21 17.
ORNL-4072 HC$3.00 MF$0.65

IRRADIATION BEHAVIOR OF EU203-STAINLESS STEEL DISPERSIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
ORNL-4104 HC$3.00 MF$0.65

POSSIBLE HEAD-END PROCESSES FOR HEAVY-WATER-MODERATED ORGANIC-COOLED REACTOR (HWOCR) FUELS,
Oak Ridge National Lab., Tenn.
L. M. Ferris. Jul 67, 38p
Contract W-7405-eng-26

Descriptors: (*Heavy water reactors, *Organic cooled reactors), (*Reactor fuels, Reactor moderators), Fluidized bed processes.

For abstract, see NSA 21 17.
ORNL-4109 HC$3.00 MF$0.65

GRIND-LEACH PROCESS FOR GRAPHITE-BASE REACTOR FUELS THAT CONTAIN COATED PARTICLES LABORATORY DEVELOPMENT,
Oak Ridge National Lab., Tenn.
L. M. Ferris. Jun 67, 52p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, *Graphite), (*Uranium compounds, Oxides), (*Thorium compounds, *Carbides), Recovery, Oxidation, Particles, Coatings, Nuclear physics laboratories.

For abstract, see NSA 21 17.
ORNL-4110 HC$3.00 MF$0.65

NEAR-SURFACE DIFFUSION ANOMALY IN GOLD,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
ORNL-4141 HC$3.00 MF$0.65

TECHNIQUES FOR THINNING PLUTONIUM FOR TRANSMISSION ELECTRON MICROSCOPY,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Arvel W. Brewer. 3 May 67, 8p
Contract AT (29-1)-1106

Descriptors: (*Plutonium, *Electron microscopy), (*Plutonium alloys, Microstructure), Crystal lattices structure, Electrolytic polishing, Foils, Gallium, Thickness.

For abstract, see NSA 21 17.
RFP-899 HC$3.00 MF$0.65

LOW TEMPERATURE ADSORPTION OF OXYGEN ON SINTERED PLUTONIUM DIOXIDE,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
J. L. Stakebake, and M. R. Dringman. 19 Jun 67, 9p
Contract AT (29-1)-1106

Descriptors: (*Plutonium compounds, Dioxides), (*Oxygen, Adsorption), Sintering, Surface area, Particle size, Oxidation, Low-temperature research.

For abstract, see NSA 21 18.
RFP-915 HC$3.00 MF$0.65

TENSILE PROPERTIES OF GAMMA QUENCHED AND AGED URANIUM-RICH NIOBIUM ALLOYS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
RFP-933 HC$3.00 MF$0.65

FUEL ROD TRANSIENT HEAT TRANSFER EXPERIMENTS AND ANALYSIS,
Sandia Corp., Albuquerque, N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
SC-RR-67-19 HC$3.00 MF$0.65

DIFFUSION-THEORY DEPLETION ANALYSIS OF THE YANKEE CORE,
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
WCAP-6077 HC$3.00 MF$0.65

18K. Reactor Physics

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, MAY 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
ANL-7342 HC$3.00 MF$0.65

PUO2 GRAIN REACTIVITY EFFECTS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
F. R. Czerniejewski. Jun 67, 22p
Contract AT (45-1)-1830

Descriptors: (*Plutonium compounds, Dioxides), (*Reactor fuels, Grain size), Test reactors, Reactor moderators.

For abstract, see NSA 21 18.
BNWL-427 HC$3.00 MF$0.65

COMPILATION OF DOUBLY DIFFERENTIAL CROSS SECTIONS AND THE SCATTERING LAW FOR H2O AND D2O AT 299 DEGREES K AND FOR H2O AT 268 DEGREES K,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 18.
BNWL-436 HC$3.00 MF$0.65

EFFECTS OF UO2 CRYSTALLINE BINDING ON DOPPLER COEFFICIENTS CALCULATIONS FOR FAST REACTOR SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
R. E. Schenter. Jun 67, 12p
Contract AT (45-1)-1830

Descriptors: (*Fast reactors, *Doppler effect), (*Fast neutrons, *Critical assemblies).

For abstract, see NSA 21 18.
BNWL-442 HC$3.00 MF$0.65

6 Li AND 7 Li DATA IN THE ENDF/B FORMAT,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 18.
LA-3695 HC$3.00 MF$0.65

DIFFERENTIAL NEUTRON ENERGY SPECTRUM MEASUREMENTS ON U233/ BE O AND U235/ BE O ASSEMBLIES IN THE REACTOR MOATA.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
R. B. Tattersall. Mar 67, 74p AAEC/E171

Descriptors: *Beryllium oxide, *Energy spectrum, *Neutron spectrum, *Uranium 233, Assembly, Beryllium, Differential, Energy, Flight, Fuel, Geometry, Moderation, Neutron, Oxide, Path, Reactor, Spectrum, Uranium 235.

For abstract, see STAR 05 20.
N67-34187 HC$3.00 MF$0.65

MEASUREMENT OF THE FLUX DENSITY AND DOSE RATE EQUIVALENT REMOVAL CROSS SECTIONS OF VARIOUS ATTENUATION MATERIALS FOR NEUTRONS.
Messung Von Flussdichte- Und Dosisleistungs-Beseitigungsquerschnitte
n Verschiedener Abschirmmaterialien Fuer Neutronen
Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Strahlenschutz.
M. Heinzelmann, and D. Nachtigall. Dec 66, 24p
JUL-435-ST
in German, English Summary

Descriptors: *Attenuation coefficient, *Neutron, *Radioactive material, *Reactor material, Attenuation, Coefficient, Counter, Cross, Density, Dose, Dosimeter, Energy, Equivalent, Flux, Germany, Material, Measurement, Polyethylene, Radioactivity, Rate, Reactor, Removal, Scintillation, Section.

For abstract, see STAR 05 20.
N67-34360 HC$3.00 MF$0.65

THE EFFICIENCY OF THE ABSORBERS IN THE LATINA REACTOR.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-34366 HC$3.00 MF$0.65

THE DATA REQUIREMENTS OF THE TRIANGULAR MESH NEUTRON CODES TRIFID AND RAVEN.
United Kingdom Atomic Energy Authority, Risley (England). Reactor Group.
C. W. Mc Callien. 1967, 32p TRG-1374/R/

Descriptors: *Computer program, *Data analysis, *Fortran, *Neutron, *Particle diffusion, *Reactor physics, Advance, Analysis, Code, Computer, Cooling, Data, Diffusion, Dimensional, Equation, Gas, Graphite, Hero reactor, Input, Lattice, Map, Mesh, Multigroup, Nuclear, Particle, Physics, Point, Program, Reactor, Requirement, Sink, Solution, Source, Tape, Triangle, Two.

For abstract, see STAR 05 20.
N67-34420 HC$3.00 MF$0.65

18L. Reactors (Power)

THE FIRST CORE REPLACEMENT PM-3A NUCLEAR POWER PLANT, McMURDO STATION, ANTARCTICA.
Nuclear Utility Services Inc Washington D C
For primary bibliographic entry see Field 18E.
AD-658 233 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

ENGINEERING DEVELOPMENT DEPARTMENT QUARTERLY REPORT, APRIL-JUNE 1966,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
BNWL-367 HC$3.00 MF$0.65

STUDY OF A PRESTRESSED CONCRETE VESSEL FOR A BOILING-WATER REACTOR OF 1000 MWE.
Societe d'Etudes et d'Equipments d'Entreprises, Paris (France).
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
EURAEC-1789 HC$3.00 MF$0.65

DEVELOPMENT OF A MODEL FOR COMPUTING 135 XE MIGRATION IN THE MSRE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
ORNL-4069 HC$3.00 MF$0.65

FABRICATION OF REBUILT BONUS REACTOR SUPERHEATER FUEL ASSEMBLY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
ORNL-4072 HC$3.00 MF$0.65

UNDERWATER CAISSON CONTAINMENT OF LARGE POWER REACTORS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
ORNL-4073 HC$3.00 MF$0.65

NUCLEAR ENERGY FOR WATER DESALTING. A BIBLIOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
TID-3584-Rev-1 HC$3.00 MF$0.65

DIFFUSION-THEORY DEPLETION ANALYSIS OF THE YANKEE CORE,
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
WCAP-6077 HC$3.00 MF$0.65

18M. Reactors (Non-Power)

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

SHIELDING CALCULATIONS FOR CONCEPTUAL DESIGN OF FFTF SODIUM SYSTEMS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 17.
BNWL-388 HC$3.00 MF$0.65

THE ATR HIGH-TEMPERATURE HELIUM LOOP MODEL DESCRIPTION AND CAPABILITIES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
BNWL-419 HC$3.00 MF$0.65

FAILURE ANALYSES AND PROPERTIES OF SAFETY ROD GUIDE TUBES FROM THE HWCTR,
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
DP-1077 HC$3.00 MF$0.65

PRELIMINARY STUDIES OF DELAYED NEUTRON EMISSION FROM SEPARATED ISOTOPES OF GASEOUS FISSION PRODUCTS,
Ames Lab., Iowa.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 18.
IS-1567 HC$3.00 MF$0.65

ADVANCED REACTOR TECHNOLOGY (ART). PART II.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
LA-3708-Pt-1 HC$3.00 MF$0.65

RADIATION DOSIMETRY STUDIES AT THE HEALTH PHYSICS RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 17.
ORNL-4113 HC$3.00 MF$0.65

18N. SNAP Technology

THE DENSIFICATION AND ENCAPSULATION OF ISOTOPIC FUELS BY HIGH ENERGY PNEUMATIC IMPACTION.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 18.
BNWL-381 HC$3.00 MF$0.65

SLIP CASTING OF RARE EARTH OXIDES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 18.
BNWL-437 HC$3.00 MF$0.65

HOT PRESSING OF RARE EARTH OXIDES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 18.
BNWL-448 HC$3.00 MF$0.65

RADIOLOGICAL ASPECTS OF THE SNAP-TRAN-2 DESTRUCTIVE TEST,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
IDO-17203 HC$3.00 MF$0.65

SNAP-23A PROGRAM. PHASE I. ADVANCED TERRESTRIAL RADIOISOTOPE POWER SYSTEMS CONVERTER DEVELOPMENT PROGRAM.
Minnesota Mining and Mfg. Co., St. Paul. Isotope Power Lab.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 18.
MMM-3824-0006 HC$3.00 MF$0.65

THERMAL BEHAVIOR OF SNAP 8 REACTOR DURING ATMOSPHERIC REENTRY,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see NSA 21 17.
NAA-SR-12355 HC$3.00 MF$0.65

SNAP 8 CONFIGURATION REENTRY HYPERSONIC HEATING RATES DERIVED FROM A SHOCK TUNNEL TEST,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see NSA 21 17.
NAA-SR-12383 HC$3.00 MF$0.65

HYDRODYNAMIC STABILITY OF THE LIQUID LAYER ON A SMALL OBJECT IN HIGH ALTITUDE REENTRY,
Stanford Univ., Calif. Dept. of Mechanical Engineering.
W. C. Reynolds. Jun 67, 44p

Descriptors: (*Reactor fuels, *Atmosphere entry), Hypersonic flow, Stability, Surface tension, Navier-Stokes equations.

For abstract, see NSA 21 18.
SC-CR-67-2636 HC$3.00 MF$0.65

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

PNEUMATIC TIMER FEASIBILITY STUDY FOR ARTILLERY FUZE APPLICATION.
Final technical rept. 17 Sep 63-16 Sep 64,
Bowles Engineering Corp., Silver Spring, Md.
Paul Baver. Oct 64, 84p Rept. no. R-10-16-64
Contract DA-36-034-AMC-0212A

Descriptors: (*Fuzes (Ordnance), Pneumatic systems), (*Pneumatic devices, *Timing devices), Feasibility studies, Artillery, Firing circuits, Timing circuits, Packaging, Design, Tests, Oscillators, Stability.

The objective of the present study is the determination of the feasibility of applying the concepts of pneumatic timing to meet the requirements demanded of artillery fuzing including the establishing of the advantages and limitations of proposed pneumatic systems attempting to conform to typical artillery fuze specifications and the finding of indications of possible solutions to the various problems which may arise. System design, packaging, and environmental effects were studied, solutions were found to problems, and a complete feasible timer system was proposed, based on the results of these studies. A practical demonstration of the proposed timer was given by a working breadboard model and an end item size packaging model. The determination of the feasibility of the timer is substantiated by experimental evidence supported by theoretical considerations. Recommendations, based on the results and conclusions from this study, are presented in this report to guide further work. The resulting fuze timer concept is a timer, settable in 0.1 second increments up to 180 seconds (accuracy 0.2 second dispersion), capable of packaging within a conventional artillery fuze contour, withstanding standard military tests, and capable of operating under conventional artillery projectile environmental conditions. (Author)
AD-450 413 HC$3.00

PREDICTION OF DETONATION HAZARD IN SOLID PROPELLANTS.
Technical paper,
Picatinny Arsenal Dover N J
Stanley Wachtell. 1963, 26p
Presented at Symposium on Explosives and Hazards and Testing of Explosives; National Meeting, American Chemical Society, Division of Fuel Chemistry (145th), New York, N. Y. Sept. 8-13, 1963.

Descriptors: (*Propellants, Detonations), (*Solid rocket propellants, Hazards), (*Detonations, Predictions), Explosive materials, Combustion, Burning rate, Pressure, Configuration, Test equipment, Pressure vessels, Ammunition propellants, Rocket propellants.

Experimental demonstrated that when a large mass of an explosive or propellant is burned in a closed system, a sharp change in slope of the burning rate/pressure curve occurs at a pressure which is specific for that material. From the transition pressure and the slope of the transition curve and from the physical configuration of a missile motor, the hazard of detonation may be determined. To extend the range of measurements possible, a pressure vessel has been developed in which measurements of propellant burning rate at pressures as high as 250,000 psi can be made. This vessel has a unique design consisting of two concentric cylinders. Radial stresses are taken by the inner cylinder, which is replaceable if fracture should occur. Recording of pressure information precedes fracture of the inner vessel. The outer cylinder carriers only axial stresses and is of sufficient strength to prevent fracture and retain fragments. The development of this vessel also made possible the examination of burning characteristics of cannon propellants for very high pressure applications. Results show that some standard cannon propellants have transition characteristics similar to those described for explosives and rocket propellants. This phenomenon explains some disastrous incidents resulting from very high pressure gun firings.
AD-657 605 HC$3.00 MF$0.65

THERMAL EXPANSION STUDIES ON TNT,
Naval Ordnance Test Station China Lake Calif
William Roderick Eubank, and Robert W. Van Dolah. 24 Aug 50, 24p Rept no. NOTS-316
NAVORD-1252

Descriptors: (*TNT, Thermal expansion), Symmetry (Crystallography), Anisotropy, Creep, Thermal shock, Fracture (Mechanics), Calorimetry.

Coefficients of thermal expansion for the three crystallographic axes of alpha-TNT were determined. The coefficient for the intermediate and long axes is about 0.00005 in./in./deg. C, and that for the short axis averages about four times this value. The thermal expansion along the short axis showed marked changes at temperatures from 55 to 65C. Plastic flow was observed along the intermediate and long axes at temperatures 8 or 9C below the melting point. Little or no flow was noted along the short axis. These observations indicate that TNT crystals have anisotropic physical properties. Thermal-shock experiments showed that fracture occurs along the short axis perpendicular to the long axis. Heating curve data did not uncover an energy change for TNT below the melting point.
AD-657 640 HC$3.00 MF$0.65

FIRST LIMIT OF THE HYDROGEN + OXYGEN REACTION IN VESSELS COATED WITH BARIUM BROMIDE,
Manchester Coll of Science and Technology (England) Dept of Chemistry
For primary bibliographic entry see Field 21B.
AD-657 737 Not available from CFSTI.

LONGITUDINAL SOUND VELOCITIES OF GRANULAR COMPACTS OF AMMONIUM PERCHLORATE AND POTASSIUM CHLORIDE,
Stanford Research Inst Menlo Park Calif Poulter Labs
B. O. Reese, J. H. Blackburn, L. B. Seeley, and M. W. Evans. Feb 67, 6p
AFOSR-67-2036
Contract AF 49 (638)-1669
Availability: Published in Combustion and Flame v11 n3 p262-4 Jun 1967.

Descriptors: (*Shock (Mechanics), *Explosive materials), (*Sound, Measurement), Ammonium perchlorate, Propellants, Velocity, Chemical reactions, Potassium compounds, Chlorides, Particle size, Detonation waves, Pressure, Volume, Mechanical waves, Thickness, Least squares method, X-ray diffraction analysis, Crystals.

Measurements of longitudinal sound velocity in columns of granular ammonium perchlorate and potassium chloride were made in connection with a study of chemical reaction in shocks in heterogeneous solid propellants and explosives. For ammonium perchlorate sound velocity varied from 0.6 mm/microsec for a pressing at 1.0g/cu cm to 3.9mm/microsec for a solid crystal. Measurements for three grain-size distributions with means at 13, 76 and 500 microns showed a definite particle size effect, but the velocities were less dependent on grain size than on density. Similar measurements on potassium chloride lay in the same range. The results at 1.0g/cu cm indicated that shocks intense enough to initiate detonation in ammonium perchlorate were simple in both materials. Thus from

the point of view of the mechanics of the pressing, potassium chloride is a good non-reactive comparison material for ammonium perchlorate at this density. (Author)
AD-657 743 Not available from CFSTI.

THE EFFECT OF NON-EQUILIBRIUM COMBUSTION ON PROPELLANT PERFORMANCE,
California Univ Berkeley Thermal Systems Div
Robert F. Sawyer. Jul 67, 15p Rept no. TS-67-3
AFOSR-67-2004
Grant AF-AFOSR-1256-67

Descriptors: (*Propellants, *Combustion), Performance (Engineering), Hydrazine, Nitrogen, Tetroxides, Rockets, Nozzle gas flow, Equilibrium, Dynamics.

Most calculations of propellant performance, including those considering kinetic nozzle flows, are based on equilibrium composition in the combustion chamber. Departures from equilibrium combustion are cited and the effect of non-equilibrium or kinetic combustion upon propellant performance for the hydrazine/nitrogen tetroxide combination is reported. Non-equilibrium combustion may yield performance either greater than or less than equilibrium combustion. (Author)
AD-657 791 HC$3.00 MF$0.65

THE EXPLOSIVES MODELING FACILITY AT THE BALLISTIC RESEARCH LABORATORIES.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 14B.
AD-658 226 HC$3.00 MF$0.65

RADAR CONTINUOUS-WAVE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17I.
AD-658 370 HC$3.00 MF$0.65

19D. Explosions, Ballistics, and Armor

DEBRIS FORMATION AND TRANSLATION.
Final rept.,
IIT Research Inst Chicago Ill Technology Center
Ralph L. Barnett, James F. Costello, and David I. Feinstein. Nov 66, 192p
Contract OCD-PS-64-201

Descriptors: (*Debris, *Blast), Fragmentation, Predictions, Structural parts, Panels (Structural), Models (Simulations), Computer programs, Trajectories, Loading (Mechanics), Fracture (Mechanics), Stresses.

A comprehensive view is taken of the physical models required to estimate volumes and heights of blast-initiated debris. Particular emphasis and development is directed toward three areas: the fragmentation of frangible elements, the failure of elements with limited ductility, and the transport of debris particles by blast winds. Computer programs to handle the computations involved in these three models have been written. (Author)
AD-657 603 HC$3.00 MF$0.65

PREDICTION OF DETONATION HAZARD IN SOLID PROPELLANTS.
Picatinny Arsenal Dover N J
For primary bibliographic entry see Field 19A.
AD-657 605 HC$3.00 MF$0.65

COMPUTER ANALYSIS OF PROTECTIVE STRUCTURES FOR PROTECTION FROM NUCLEAR BLAST.
Final rept.,
Lin (T Y) and Associates Van Nuys Calif
Kalman L. Benuska. Jun 65, 58p Rept no. 64248
Contract OCD-PS-65-7

Descriptors: (*Computer programs, *Blast), (*Nuclear explosions, *Structures), Shock (Mechanics), Detonation waves, Pressure, Computers, Protection, Air, Equations, Vibration.

The report describes the results of an investigation into the most advantageous approach for developing a computer program suitable for making blast analyses of 'box-type' structures. Airblast loadings and ground motions are reviewed. The mathematical formulation for calculating the dynamic response of lumped mass systems is presented. Both the mode-superposition and the step-by-step techniques are described. (Author)
AD-657 612 HC$3.00 MF$0.65

EXPLOSION PRODUCT REDISTRIBUTION MECHANISMS FOR SCALED MIGRATING UNDERWATER EXPLOSION BUBBLES,
Naval Radiological Defense Lab San Francisco Calif
John W. Pritchett. 23 May 66, 150p Rept no. USNRDL-TR-1044

Descriptors: (*Underwater explosions, *Bubbles), (*Hydrodynamics, Underwater explosions), Nuclear explosions, Mechanics, Compressive properties, Motion, Gravity, Sampling, Detonation waves, Pressure, Shock waves, Density, High-speed photography, Energy, Tables, Environmental tests.

A submerged gold wire was electrically exploded to simulate a very deep underwater nuclear detonation. These small-scale tests were conducted in a test tank in which the air pressure may be varied to obtain various strengths of buoyant bubble migration. The mechanics of explosion bubble formation, pulsation, and migration are discussed, and relevant relationships are derived for scaling large-yield bubble behavior in the laboratory by variation of environmental parameters. The mechanisms by which the explosion products, initially at the bubble center during the first cycle, are redistributed by bubble bottom collapse, compression, reexpansion, and migration, are investigated. The experimental technique involved physically sampling the bubble and its environment at the second bubble maximum to define the extent and nature of explosion product re-distribution. Three different shot conditions were investigated, corresponding to a 'rest-point' condition, a condition characterized by slight upward migration, and ne characterized by strong upward migration. In all cases, it was found that most (77 to 94%) of the explosion products are lost to the environment by the time of the second bubble maximum. The probable mechanisms for this loss are discussed, and rules are derived for application of these results to full-scale underwater bursts. (Author)
AD-657 939 HC$3.00 MF$0.65

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED AIRCREWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS: (COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTOR AND THREE SUSPENSION SYSTEMS).
Army Natick Labs Mass Pioneering Research Div
For primary bibliographic entry see Field 6Q.
AD-658 034 HC$3.00 MF$0.65

NUMERICAL INTEGRATION METHODS FOR BALLISTIC ROCKET TRAJECTORY SIMULATION PROGRAMS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Randall K. Walters. Jun 67, 40p
ECOM-5134

Descriptors: (*Rocket trajectories, *Numerical methods and procedures), Ballistics, Differential equations, Algorithms, Errors, Mathematical analysis.

Numerical integration methods for solution of the system of differential equations found in ballistic rocket trajectory programs are discussed. The general discussion entails the explicit formulas of Runge-Kutta and predictor-corrector methods and their errors, and a brief description of other methods that could be employed. (Author)
AD-658 064 HC$3.00 MF$0.65

19E. Fire Control and Bombing Systems

FLIGHT AND FIRING EVALUATION OF A SURFACE-TO-AIR GUNNERY TOW TARGET.
Final rept.,
Naval Air Development Center Johnsville Pa Aero Mechanics Dept
W. H. Setz. 21 Sep 67, 15p Rept no. NADC-AM-6737

Descriptors: (*Aerial targets, Towed bodies), Surface-to-air, Antiaircraft gunnery, Acoustic equipment, Proximity devices, Counting methods, Performance (Engineering).

The report describes an aerial gunnery tow target fitted with visual augmentation and an acoustic scorer. Results of surface fired 20MM gunfire on 350 K., 250 to 1,500 ft. altitude targets towed by standard Navy towing aircraft are included. (Author)
AD-658 315 HC$3.00 MF$0.65

19F. Guns

TRAINING 90 MM AA GUN CREWS. APPENDIX IV. TRAINING AIDS AND DEVICES.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 5I.
AD-657 947 HC$3.00 MF$0.65

19G. Rockets

ANALYSIS OF PRESSURE MEASUREMENTS TAKEN AT ALTITUDES BETWEEN 30 AND 90 KM BY CONE-CYLINDER PITOT-STATIC PROBES.
Sandia Corp., Albuquerque, N. Mex.
For primary bibliographic entry see Field 22B.
For abstract, see NSA 21 17.
SC-RR-67-251 HC$3.00 MF$0.65

20. PHYSICS

20A. Acoustics

DISCRIMINATION OF SMALL TIME INTERVALS BETWEEN A VISUAL AND AN AUDITORY SIGNAL.
Johns Hopkins Univ Baltimore Md Psychological Lab
For primary bibliographic entry see Field 5J.
AD-657 623 HC$3.00 MF$0.65

DESCRIPTIONS OF FLYOVER NOISE SIGNALS PRODUCED BY VARIOUS JET TRANSPORT AIRCRAFT.
Technical rept.,
Bolt Beranek and Newman Inc Los Angeles Calif
Dwight E. Bishop. Aug 67, 67p
FAA-DS-67-18
Contract FA-65-WA-1260

Descriptors: (*Jet plane noise, Sound signals), (*Sound signals, Auditory perception), Spectroscopy, Frequency, Measurement, Transport planes, Mathematical analysis.

The report provides descriptions of maximum levels and ime durations for 45 flyover noise signals produced by a variety of turboject and turbofan transport aircraft in current airline service. The descriptions are based upon one-third octave band noise spectra determined at one-half second intervals throughout the flyover time histories. Comparisons are provided between integrated perceived noise levels, effective perceived noise levels, perceived noise levels calculated from the maximum third-octave band noise levels occurring during the flyover and N-weighted noise levels. Comparison of various duration measurements and corrections are also presented for durations measured at levels of 10 dB and 20 dB down from the maximum flyover levels. Comparisons indicate high correlation among many of the different measures describing maximum noise levels and duration. (Author)

AD-657 633 HC$3.00 MF$0.65

THE FRENET FORMULATION OF THREE-DIMENSIONAL RAY TRACING,

Navy Underwater Sound Lab New London Conn

Edward S. Eby. 15 Jun 67, 39p Rept no. USL-812

Availability: Published in Journal of Acoustical Society of America 39p Nov 1967.

Descriptors: (*Underwater sound, *Acoustics), (*Snell's law, Mathematical analysis), Ellipsoids, Differential equations, Velocity, Diffraction, Spheres, Cylindrical bodies, Special functions (Mathematical), Optical properties.

An approach to three-dimensional ray tracing, based on the ray equations and Frenet Formulas, is developed. It is applied to two families of constant sound-speed surfaces for which Snell's Laws are not known: coaxial circular cylinders and concentric ellipsoids. The classically known results for the cases of parallel planes and concentric spheres are rederived in terms of the present formulation. It is shown that the ray-tracing equations for concentric spheres can be transformed exactly into those for parallel planes. For the coaxial cylinder case, pseudo-Snell's Laws can be derived even though the ray paths are not plane curves. For the family of ellipsoids, no Snell's Law was found, but ray paths are plane curves. The examples considered do not exhaust the applicability of this ray-tracing approach, but are meant only to illustrate the technique. (Author)

AD-657 813 Not available from CFSTI.

DIFFRACTION OF PLANE ACOUSTIC PULSES BY OBSTACLES OF ARBITRARY CROSS SECTION WITH AN IMPEDANCE BOUNDARY CONDITION,

State Univ of New York Buffalo Div of Interdisciplinary Studies and Research

Richard P. Shaw. Mar 67, 31p Rept no. 19

Contract Nonr-4449 (00), Grant NSF-GP-56-75

Descriptors: (*Sound, *Diffraction), (*Boundary value problems, Diffraction), Integral equations, Differential equations, Scattering, Acoustics.

The diffraction of an arbitrary acoustic pulse by an arbitrary scattering obstacle with an impedance boundary condition is treated. The problem is formulated as an integro-differential equation on surface values of pressure or velocity; this equation is then solved numerically for the specific geometry of a long cylinder of square cross section struck laterally by a step pulse in pressure. A useful economy is that the coefficients used in the approximation are independent of the boundary condition and are identical to those used for previous studies involving the same geometry. Results indicate that the surface pressure decreases from the rigid body solution for infinite impedance to an almost constant level for the boundary impedance equal to the fluid impedance. (Author)

AD-657 844 HC$3.00 MF$0.65

SCATTERING OF ELASTIC WAVES BY RIGID OBSTACLES OF ARBITRARY SHAPE,

State Univ of New York Buffalo Div of Interdisciplinary Studies and Research

Richard P. Shaw. May 67, 17p Rept no. 24

Contract Nonr-4449 (00)

Descriptors: (*Sound, Scattering), (*Mechanical waves, Scattering), Integral equations, Differential equations, Stresses, Strain (Mechanics).

The scattering of elastic waves by rigid obstacles of arbitrary shape is discussed in terms of an integro-differential equation similar to Kirchoff's equation. This approach has proved valuable in the treatment of acoustic scattering problems and the extension proposed is relatively straightforward. The advantage of this approach is that the problem can be formulated completely in terms of surface values of stress and strain thereby reducing the order of magnitude of the problem. From a numerical point of view this is a significant economy. Field values can be obtained from the surface values by a direct quadrature if required. A simple problem is discussed as an example of the procedure. More complicated problems are being considered as well as extensions of this approach to other boundary conditions (e.g. free, discontinuity in el stic properties, etc.). (Author)

AD-657 845 HC$3.00 MF$0.65

ULTRASONIC VELOCITY AND DISPERSION IN LIQUID HELIUM II FROM 0.15 to 1.8K,

Massachusetts Ins of Tech Cambridge National Magnet Lab

For primary bibliographic entry see Field 20L.

AD-657 903 Not available from CFSTI.

BOLOMETRIC DETECTION OF COHERENT 9-GHz LONGITUDINAL PHONONS IN X-CUT QUARTZ.

Massachusetts Inst of Tech Cambridge Research Lab of Electronics

For primary bibliographic entry see Field 20B.

AD-657 912 Not available from CFSTI.

ACOUSTIC KINK INSTABILITY IN AN ARGON DISCHARGE,

Massachusetts Inst of Tech Cambridge Research Lab of Electronics

For primary bibliographic entry see Field 20I.

AD-657 923 Not available from CFSTI.

ERRORS IN POWER SPECTRA DUE TO FINITE SAMPLE,

Johns Hopkins Univ Silver Spring Md Applied Physics Lab

L. M. Spetner. 30 Jun 53, 26p Rept no. CF-2040

Descriptors: (*Noise, *Power spectra), (*Sampling, Accuracy), Periodic variations, Random variables, Fourier analysis, Probability, Statistical analysis.

An estimate is made of the accuracy with which the 'spectrum' of a finite sample of noise approximates the spectrum of the original noise from which the sample was taken. The sample is considered to be spliced into an endless loop to form a periodic function, and all measurements are assumed perfect. (Author)

AD-658 132 HC$3.00 MF$0.65

THE INTERACTION OF SOUND WAVES WITH FLAME IN A DUCT,

Johns Hopkins Univ Silver Spring Md Applied Physics Lab

For primary bibliographic entry see Field 21B.

AD-658 133 HC$3.00 MF$0.65

ON THE CALCULATION OF THE MAXIMUM SOUND PRESSURE SPECTRUM FROM FIXED AND MOBILE JETS.

France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.

For primary bibliographic entry see Field 1B.

For abstract, see STAR 05 20.

N67-34013 HC$3.00 MF$0.65

ACOUSTIC SPECTRUM SHAPING UTILIZING FINITE HYPERBOLIC HORN THEORY.

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

C. D. Hayes. 15 Aug 67, 33p NASA-CR-87499, JPL-TR-32-1141

Contract NAS7-100

Descriptors: *Acoustics, *Spectrum, Array, Computer program, Digital, Frequency, Horn, Hyperbola, Response.

For abstract, see STAR 05 20.

N67-34290 HC$3.00 MF$0.65

MODEL FOR PREDICTION OF JET NOISE FROM MEASUREMENTS OF FLUCTUATION TURBULENT STRESSES.

Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.

For primary bibliographic entry see Field 1B.

For abstract, see STAR 05 20.

N67-34392 HC$3.00 MF$0.65

POWER SPECTRAL DENSITY ANALYSIS.

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

C. D. Hayes. 15 Mar 67, 14p NASA-CR-87804, JPL-TR-32-928, REV. 1

Contract NAS7-100

Revision 1

Descriptors: *Density distribution, *Functional analysis, *Power spectrum, Analysis, Density, Distribution, Equation, Functional, Mean, Power, Root, Spectrum, Square, Value.

For abstract, see STAR 05 20.

N67-35129 HC$3.00 MF$0.65

THE RADIATION SOUND FIELD OF A RECTANGULAR PANEL SET IN AN INFINITE WALL AND EXCITED BY A TURBULENT BOUNDARY LAYER.

Gt. Brit. Ministry of Aviation, London. Aeronautical Research Council.

D. E. Davies. 1967, 36p ARC-R+M-3491, RAE-TN-STRUCT-355

Descriptors: *Radiation field, *Rectangular panel, *Sound field, *Turbulent boundary layer, Boundary, Correlation, Dependence, Derivation, Dimension, Distribution, Excitation, Expression, Field, Flexible, Flow, Force, Function, Infinite, Intensity, Layer, Material, Panel, Plate, Power, Property, Radiation, Rectangle, Sound, Spectrum, Speed, Thickness, Turbulent, Vibration, Wall.

For abstract, see STAR 05 20.

N67-35179 HC$3.00 MF$0.65

SIMILARITY OF NEAR NOISE FIELDS OF SUBSONIC JETS.

Technical rept.,

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.

Walton L. Howes. 18 Aug 60, 56p NASA-TR-R-94

AD-251 597, N62-70518

Descriptors: (*Aerodynamic noise, *Subsonic characteristics), (*Jets, Aerodynamic noise), Nozzle gas flow, Acoustic properties.

Similarity rel tions for frequency-pass-band, as well as overall, time-averaged pressure fluctuations outside a jet are derived and tested using experimental data. Similarity of the pressure fields was found for different jet velocities. Nozzle contour dissimilarity and differing jet temperatures were found to limit seriously the application of the similarity relations, especially near the jet nozzle. (Author)
PB-175 906 HC$3.00 MF$0.65

GROUND REFLECTION OF JET NOISE.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Walton L. Howes. 15 Jan 58, 32p NASA-TR-R-35

Descriptors: (*Jet plane noise, Reflection), Propagation, Spectroscopy, Subsonic characteristics, Attenuation, Mathematical analysis.

The effect of a reflecting plane is determined from theory and experiment. From the theoretical characteristics of far-field acoustic decay a correction-to-free-field procedure is developed for data obtained in the presence of a plane. Measurements of jet noise indicated the practical significance of reflections. Several theoretical predictions were confirmed from experimental decay curves and corrected spectra. (Author)
PB-175 908 HC$3.00 MF$0.65

20B. Crystallography

STRUCTURE OF ALPHA GeTe,
Chicago Univ Ill Inst for the Study of Metals
J. Goldak, C. S. Barrett, D. Innes, and W. Youdelis. 8 Nov 65, 6p
AROD-4886:14
Grant DA-ARO (D)-31-124-G542
Prepared in cooperation with Alberta Univ., Edmonton (Canada). Dept. of Metallurgy.
Availability: Published in Journal of Chemical Physics v44 n9 p3323-5 May 1 1966.

Descriptors: (*Semiconductors, *Crystal structure), (*Germanium compounds, Crystal structure), (*Tellurides, Crystal structure), Crystal lattices, X-ray diffraction analysis, Band theory of solids, Canada.
Identifiers: Germanium tellurides.

The parameters in the crystal structure of alpha-GeTe were determined by least-squares analysis of intensity data obtained with an automatic x-ray powder diffractometer. The rhombohedral cell containing 4 Ge and 4 Te atoms has a=5.996 plus or minus 0.001 A, alpha=88.18 deg, and the single atom-position parameter x=0.237 plus or minus 0.002. The displacement of one sublattice with respect to the other from the relative position that would correspond to the NaCl structure (i.e., x=0.250) corroborates the predictions, based on band calculations, of Cohen, Falicov, and Golin. (Author)
AD-657 544 Not available from CFSTI.

LATTICE DYNAMICS OF WURTZITE: CdS.
New York Univ N Y Dept of Physics
For primary bibliographic entry see Field 20L.
AD-657 714 Not available from CFSTI.

CORRECTION TO THE ENERGY OF A CRYSTAL IN THE AMO APPROXIMATION,
Uppsala Univ (Sweden) Quantum Chemistry Group
Jan Linderberg, and Jean-Louis Calais. 9 Nov 66, 4p
AFOSR-67-1970
Contract AF 61 (052)-874
Availability: Published in Arkiv fuer Fysik v33 n8 p103-4 1966.

Descriptors: (*Crystal lattices, *Molecular orbitals), Chemical bonds, Brillouin zones, Crystal substructure, Sweden.

A correction is pointed out for the following publication 'Calais J.L., Arkiv Fysik 28,479 (1965) whose results affect the following publication 'Calais J.L., Arkiv Fysik 29,255 (1965). (Author)
AD-657 740 Not available from CFSTI.

BOLOMETRIC DETECTION OF COHERENT 9-GHz LONGITUDINAL PHONONS IN X-CUT QUARTZ.
Revised ed.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
John M. Andrews, Jr., and . W. P. Strandberg.
15 Dec 66, 3p
Contract DA-36-039-AMC-03200 (E)
Revision of manuscript submitted 18 Jul 66.
Availability: Published in Journal of Applied Physics v38 n6 p2660-2 May 1967.

Descriptors: (*Phonons, Microwave frequency), (*Detection, Phonons), Bolometers, Coherent radiation, Quartz, Rods, Microwaves, Ultrasonic radiation, Measurement, Attenuation.

Coherent longitudinal phonons at 9.0 GHz in X-cut quartz rods have been detected by means of high-speed superconducting bolometers. This type of detector is responsive to ultrasonic intensity and is insensitive to the ultrasonic phase distribution over the endface of the quartz rod, which often disguises the true nature of the echo-decay envelope when piezoelectric detection of microwave phonons is employed. These bolometers are also capable of detecting the incoherent phonons produced in the dissipation and hermalizing of the coherent microwave phonons. (Author)
AD-657 912 Not available from CFSTI.

GROWTH OF SINGLE Ti2O3 CRYSTALS FROM THE MELT.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Thomas B. Reed, Robert E. Fahey, and Jurgen M. Honig. 11 Aug 67, 13p Rept no. TN-1967-38
ESD-TR-67-343
Contract AF 19 (628)-5167

Descriptors: (*Titanium compounds, *Crystal growth), (*Single crystals, Titanium compounds), Oxides, Impurities, Electrical properties, Anisotropy, Doping.
Identifiers: Titanium oxides.

Procedures are described for growth of large single crystals of TiOx, (1.501 < or = x < or = 1.512) that are reasonably free of cationic impurities and of C and N. Data concerning the stoichiometry and the segregation of impurities during crystal growth are presented. The electrical properties of doped and pure single crystal materials are briefly described. (Author)
AD-657 978 HC$3.00 MF$0.65

SIMPLIFIED PROCEDURES FOR ESTIMATING BAND AND TOTAL EMISSIVITIES OF POLYATOMIC MOLECULES,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 7D.
AD-657 982 Not available from CFSTI.

A GENERAL FORMULATION AND SOLUTION OF CHEMICAL RATE EQUATIONS FOR USE IN NON-EQUILIBRIUM COMBUSTION STUDIES,
California Univ Berkeley Thermal Systems Div
Peteris Purgalis, and Robert F. Sawyer. Jul 67, 35p Rept no. TS-67-2
AFOSR-67-2021
Grant AF-AFOSR-1256-67

Descriptors: (*Combustion, Reaction kinetics), (Reaction kinetics, Numerical analysis), Rocket propellants, Combustion products, Differential equations, Computer programs, Nozzle gas flow.

As part of a study of non-equilibrium combustion related to rocket propulsion, a general formulation and solution of chemical rate equations was developed. Product composition change with time for arbitrarily selected homogeneous gas-phase chemical reactions is calculated. A particular reaction mechanism can be constructed through the selection of elementary reactions. A computer program was developed which translates these elementary reactions into the required reaction rate equations. The solution of these equations for the isothermal case also is described. Additionally, a systematic procedure for the collection, sorting, and use of reaction rate data is presented. (Author)
AD-658 004 HC$3.00 MF$0.65

LOW TEMPERATURE THERMAL EXPANSION OF WURTZITE-PHASES OF IIB-VIB COMPOUNDS. PART I. THERMAL EXPANSION OF ZnS, WURTZITE FROM 2 DEGREES TO 317K.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 20M.
AD-658 026 HC$3.00 MF$0.65

TETRAHEDRAL-SITE COPPER IN CHALCOGENIDE SPINELS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 027 HC$3.00 MF$0.65

RELATIONS BETWEEN POINT DEFECTS IN THE COMPOUND M2X5,
Systems Research Labs Inc Dayton Ohio
R. W. Vest, W. C. Tripp, N. M. Tallan, and H. C. Graham. May 67, 355p Rept no SRL-TR-580-C
ARL-67-0115
Contract AF 33 (657)-10815

Descriptors: (*Crystal lattice defects, Mathematical analysis), Chemical compounds, Impurities, Solids, Pressure, Crystal growth, Computers.

The results of a computer study of the mass action equations as used for the formation of point defects in binary compounds are presented. The results are in easily read tabular form from which a neutrality condition can be deduced for a particular predominant defect. The pressure dependence and the equilibrium constants involved in the formation of each defect are listed. (Author)
AD-658 054 HC$3.00 MF$0.65

AN X-RAY DIFFRACTION STUDY OF POLYCRYSTALLINE BRASS DEFORMED IN TENSION.
Martin Co Orlando Fla
For primary bibliographic entry see Field 11F.
AD-658 098 HC$3.00 MF$0.65

THE GROWTH AND ETCHING OF Si THROUGH WINDOWS IN SiO,
California Univ Berkeley Dept of Electrical Engineering
W. G. Oldham, and R. Holmstrom. 1967, 10p
AFOSR-67-2086
Grant AF-AFOSR-139-65
Availability: Published in Journal of the Electrochemical Society v114 n4 p381-8 Apr 1967.

Descriptors: (*Silicon, *Crystal growth), (*Etching, Silicon), Vapor plating, Silicon dioxide, Films, Masking, Diffusion, Concentration (Chemistry), Etched crystals, Integrated circuits, Preparation.

A theory of the kinetics of vapor deposition and etching through small openings in an oxide layer on Si is developed and compared with experiments. A model that assumes equilibrium at the Si surface and purely diffusive transport through the gas phase is used to derive the concentrations and fluxes of the interesting gaseous species in the neighborhood of the window. The previously reported concave growth surfaces and convex etching surfaces are explained by the constriction of the flow near the edges of the windows. The measured etch rate is in quantitative agreement with theoretical estimates based on this model. Furthermore, the derived concentration profiles explain the appearance and relative size of the band of oxide free from Si overgrowth which surrounds each window in the growth experiments. (Author)
AD-658 248 Not available from CFSTI.

THEORY OF POINT DEFECT ANNEALING IN METALS,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
A. C. Damask, and G. J. Dienes. Jul 63, 10p
FA-A63-7
Prepared in cooperation with Brookhaven National Lab., Upton, N. Y.
Availability: Published in Proceedings of the International Conference on Crystal Lattice Defects, 1962, Conference Journal of the Physical Society of Japan v18 Suppl-3 p272-6 1963.

Descriptors: (*Metals, Crystal lattice defects), (*Crystal lattice defects, Annealing), Theory, Solid state physics, Defects (Materials), Recombination reactions, Reaction kinetics, Impurities, Radiation damage.

The kinetics of the annealing of point defects, either by migration to sinks or by recombination, is complicated by the occurrence of a variety of simultaneous reactions. An extensive theoretical study of annealing processes is in progress at Brookhaven National Laboratory based on the isolation and combination of simple kinetic steps. When analytic solutions could not be found, computer solutions have been used to obtain useful approximations and to determine their regions of validity. Two migration reaction schemes have been studied; the simultaneous annealing of single and divacancies, and the annealing of single vacancies with impurity trapping. Three recombination reactions have been investigated; vancancy-interstitial annihilation with interstitial migration to sinks, di-interstitial formation, and interstitial trapping at impurities. (Author)
AD-658 291 Not available from CFSTI.

LASER RAMAN SCATTERING STUDIES OF CRYSTALS.
Semiannual progress rept. 16 Dec 66-15 Jun 67,
Johns Hopkins Univ Baltimore Md Dept of Physics
Herman Z. Cummins. 1 Aug 67, 16p
Contract Nonr-4010 (06), ARPA Order-306-63
See also AD-637 256.

Descriptors: (*Raman spectroscopy, *Crystals), Lasers, Strontium compounds, Quartz, Phase studies, Tungsten, Calcium compounds, Titanates.
Identifiers: Strontium titanate, Calcium tungstate, Potassium dihydrophosphate.

Temperature dependent Raman spectroscopy of quartz has revealed the existence of a new optical lattice vibration mode which appears to play a fundamental role in the alpha-beta phase transition. Continued temperature dependent Raman measurements of Strontium Titanate have also disclosed a new 'moving' component in the spectrum. Additional measurements have also shown that the three sharp Raman lines which are present at all temperatures below the 110 degrees K cubic to tetragonal transition probably arise from local breaking of the translational symmetry by inhomogeneous strain within the domain walls. Intensity vs. temperature measurements of the strong component at 78 reciprocal cm (room temperature value) have failed to confirm our earlier conclusion that part of the room temperature Raman spectrum of Strontium Titanate is of first order. Preliminary Raman measurements have been performed on KDP, and have failed to produce conclusive evidence for an anticipated 'soft' mode which was predicted by Cochran.
AD-658 342 HC$3.00 MF$0.65

COMMENTS ON THE INFLUENCE OF INTERMEDIATE EXCITONS AND EXCHANGE FORCES ON THE INTERACTION IN MOLECULAR CRYSTALS: THE CRYSTAL STRUCTURE OF CHLORINE,
Chicago Univ Ill Inst for the Study of Metals
Ian H. Hillier, and Stuart A. Rice. 25 Aug 66, 12p

AFOSR-67-2164
Grant AF-AFOSR-781-67
Availability: Published in The Journal of Chemical Physics v46 n10 p3881-9 May 15 1967.

Descriptors: (*Chlorine, *Crystal structure), (*Excitons, Molecular structure), Hamiltonian, Potential energy, Interactions, Anomalies, Wave functions, Crystal lattices, Band theory of solids, Stability.

The reasons for the failure of the Lennard-Jones potential to predict the correct space group of solid chlorine and the molecular orientation within the unit cell are examined. In the analysis given, the contribution of charge-transfer states to the intermolecular binding energy in the ground state is calculated. It is found that these states account for about 25% of the intermolecular interaction, and tend to reinforce the dispersive-repulsive forces in the region of the observed molecular angle of tilt. However, in our approximation these forces fail to account for the observed stability of the orthorhombic structure relative to the cubic structure, the latter being predicted to be more stable if the interaction is a Lennard-Jones potential. The repulsive interactions are calculated using an approximation to the exchange energy. It is concluded that the failure of the Lennard-Jones potential to predict the correct angle of molecular tilt within the unit cell arises from the incorrect form of the repulsive potential. Further, with binding energies calculated in this paper, the difference between the energies of the cubic and orthorhombic structures is much reduced from that predicted from calculations based on the use of the Lennard-Jones potential. (Author)
AD-658 352 Not available from CFSTI.

ANISOTROPY OF LONG RANGE ORDER IN ALLOYS.
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Reaktorwerkstoffe.
P. Sigmund. Dec 66, 25p JUL-421-RW

Descriptors: *Alloy, *Anisotropy, *Crystal lattice, *Sublattice distribution ratio, Crystal, Derivation, Distribution, Irradiation, Lattice, Long range, Order, Parameter, Ratio, Sequence, Set, Site, Sublattice.

For abstract, see STAR 05 20.
N67-34034 HC$3.00 MF$0.65

NEAR-SURFACE DIFFUSION ANOMALY IN GOLD,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 17.
ORNL-4141 HC$3.00 MF$0.65

APPLICATION OF MORSE POTENTIAL FUNCTION TO CUBIC METALS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Louis A. Girifalco, and Victor G. Weizer. 5 Nov 58, 15p NASA-TR-R-5
AD-229 571

Descriptors: (*Metallic crystals, Physical properties), Elasticity, Crystal structure, Compressive properties, Equations of state, Molybdenum, Tungsten, Lead, Silver, Nickel, Copper, Aluminum, Calcium, Iron, Chromium, Barium, Cesium, Potassium, Sodium, Rubidium.
Identifiers: Morse potential, Potential functions, Elastic constants, Cubic crystals.

The Morse potential function was used to express various crystal properties, including the cohesive energy, the lattice constant, the compressibility, the equation of state, and the elastic constants. From experimental values for the energy of cohesion, the lattice constant, and the compressibility, the three parameters in the Morse function were computed. The equation of state and the elastic constants were then calculated for the following metals: Face-centered cubic: Lead, silver, nickel, copper, aluminum, and calcium. Body-centered cubic: Molybdenum, tungsten, chromium, iron, barium, potassium, sodium, cesium, and rubidium. Both the calculated equations of state and the calculated elastic constants agreed with experiment. Finally, Born's stability criteria were applied to the metals, and it was found that both the face-centered and body-centered metals satisfied all the conditions. The conclusions were that, while the model used is a poor one because of the neglect of the electron gas in the metals, it can be used with validity to describe any type of deformation in both face-centered and body-centered cubic metals. (Author)
PB-175 825 HC$3.00 MF$0.65

TECHNIQUES FOR THINNING PLUTONIUM FOR TRANSMISSION ELECTRON MICROSCOPY,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 17.
RFP-899 HC$3.00 MF$0.65

20C. Electricity and Magnetism

STATISTICAL PROPERTIES OF ELECTROMAGNETIC RADIATION.
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20N.
AD-657 586 HC$3.00 MF$0.65

FIRST-ORDER PHASE TRANSITIONS IN SPIN-ONE ISING SYSTEMS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 20M.
AD-657 651 Not available from CFSTI.

ELECTRODYNAMICS OF MOVING MEDIA.
Special technical rept.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Paul Penfield, Jr., and Hermann A. Haus. 1967, 288p Rept no. STR-14, Research Mono-40
Contract DA-36-039-AMC-03200 (E)
Availability: Available from Massachusetts Inst. of Tech., Cambridge, Mass., $12.50.

Descriptors: (*Electromagnetic fields, Dynamics), (*Physics, Reviews), Force (Mechanics), Partial differential equations, Relativity theory, Continu-

um mechanics, Momentum, Heat transfer, Solids, Stresses, Magnetic fields, Dielectric properties, Ferrites, Fluid dynamic properties, Vector analysis, Thermodynamics.
Identifiers: Spin waves, Electrodynamics, Virtual power, Action principle.

Contents: Nonrelativistic continuum mechanics and thermodynamics; Electromagnetism and simple polarizable fluid; Nonrelativistic principle of virtual power; Relativistic principle of virtual power; Hamilton's principle; Comparison of several formulations of electrodynamics of moving media; Electrodynamics literature.
AD-657 672 Not available from CFSTI.

RARE EARTH COMPOUNDS,
Durham Univ (England) Dept of Physics
For primary bibliographic entry see Field 20L.
AD-657 686 Not available from CFSTI.

A USEFUL MATRIX INVERSION FORMULA AND ITS APPLICATIONS.
Syracuse Univ N Y Dept of Electrical Engineering
For primary bibliographic entry see Field 12A.
AD-657 711 Not available from CFSTI.

PARAMAGNETIC RESONANCE IN RARE EARTH METALS.
Sheffield Univ (England) Dept of Physics
For primary bibliographic entry see Field 20L.
AD-657 790 HC$3.00 MF$0.65

THE MICROWAVE SURFACE RESISTANCE OF SUPERCONDUCTING LEAD, TRAPPED MAGNETIC FLUX, AND A NEW MAGNETOMETER USING SUPERCONDUCTIVITY.
Technical rept.,
Stanford Univ Calif High Energy Physics Lab
John Morley Pierce. Jun 67, 84p Rept no. HEPL-514
Contract Nonr-225 (67)

Descriptors: (*Magnetometers, *Superconductivity), Superconductors, Lead, Microwave frequency, Degradation, Measurement, Sensitivity, Magnetic fields, Surface properties, Resistance (Electrical).

An investigation has been made into the causes of the residual surface resistance which is always observed in superconductors at microwave frequencies. A new and extremely sensitive magnetometer has been developed which uses unique properties of superconductivity. Calculations and measurements indicate that this magnetometer can detect a field change of 3 x 10 to the minus 10th power gauss in a loop with 1 cm radius. The magnetometer uses a superconducting loop in which a field change is translated into a persistent current. Linking the loop is a cylinder of superconductor which can be switched alternately between the normal and superconducting states at a frequency of 150 KHz. Since the magnetic flux linking a superconducting cylinder is quantized, inductive impulses are given to the loop, and a large oscillation is built up which is proportional to the persistent current. The result is an output power equivalent to spinning the sensing loop at a frequency approximately 1,000,000 Hz. This accounts for the great sensitivity. (Author)
AD-657 931 HC$3.00 MF$0.65

THE SEMICONDUCTIVE PROPERTIES OF LIPIDS AND THEIR RELATION TO THE ELECTRICAL CONDUCTIVITY OF LIPID BILAYERS.
Michigan State Univ East Lansing Dept of Biophysics
For primary bibliographic entry see Field 6A.
AD-657 954 HC$3.00 MF$0.65

HALL COEFFICIENT AND TRANSVERSE MAGNETORESISTANCE IN HgTe AT 4.2K AND 77K.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 089 HC$3.00 MF$0.65

THE SYSTEM NEODYMIUM - MANGANESE (STRUCTURES, MAGNETIC PROPERTIES, PHASE DIAGRAM), THE PHASE DIAGRAMS Yb-Hg AND Tb-Hg,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
For primary bibliographic entry see Field 11F.
AD-658 216 HC$3.00 MF$0.65

PREPARATION OF THE INTERMETALLIC COMPOUND YCo5 BY THE AMALGAM PROCESS,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
For primary bibliographic entry see Field 11F.
AD-658 218 HC$3.00 MF$0.65

MOTION OF ELECTRONS IN LIQUID ARGON.
Chicago Univ Ill Inst for the Study of Metals
For primary bibliographic entry see Field 7D.
AD-658 353 Not available from CFSTI.

DIFFRACTION EFFECTS IN LORENTZ MICROSCOPY.
Revised ed.,
California Univ San Diego La Jolla
Dieter Wohlleben. 24 Jul 67, 14p
AFOSR-67-2155
Grant AF-AFOSR-631-64
Revision of manuscript submitted 19 Dec 66. Prepared for presentation in part at the Annual Conference on Magnetism and Magnetic Materials (12), Washington, D. C., November 1966.
Availability: Published in Journal of Applied Physics v38 n8 p3341-52 Jul 1967.

Descriptors: (*Magnetic materials, Electron microscopy), (*Electron microscopy, Diffraction), Electron optics, Magnetic fields, Electron beams, Deflection, Ferromagnetism, Films, Images, Resolution, Superconductors.
Identifiers: Lorentz microscopy, Magnetic domains.

Several electron optical techniques are in use to study microscopic magnetic field distributions through deflection by the Lorentz force (Lorentz microscopy). It is shown that for most cases of practical interest the deflected electrons must be treated quantum mechanically in order to extract quantitatively information on the structure of the field inhomogeneity from the experimental electron record. The lateral wave length of an electron deflected in a weak magnetic field is independent of the initial electron momentum and is often of the order of the lateral extent of the structure under investigation. For instance, in ferromagnetic thin films, Lambda-lat approx = 1000A behind domain walls 3000A wide, or Lambda-lat approx. = 10 microns behind ripples with 2 micron period. It is well known that the geometric approach to contrast formation can break down in such cases (Abbe's sine condition). The Foucault mode is shown to be inferior to the defocused mode for quantitative high-resolution Lorentz microscopy. (Author)
AD-658 363 Not available from CFSTI.

HEAT TRANSFER IN ROTATED ARCS WITH WATER-COOLED ELECTRODES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13A.
AD-658 373 HC$3.00 MF$0.65

DAMPING OF DISLOCATIONS IN LEAD SINGLE CRYSTALS.
Columbia Univ New York Inst for the Study of Fatigue and Reliability
For primary bibliographic entry see Field 20K.
AD-658 412 Not available from CFSTI.

BOSE-EINSTEIN CONDENSATION AND SUPERCONDUCTIVITY,
Los Alamos Scientific Lab., N. Mex.
Leonard W. Gruenberg. Jan 67, 47p
Contract W-7405-eng-36

Descriptors: (*Superconductivity, Condensation), (*Wave functions, Theorems), Integral transforms, Magnetic fields, Interactions.

For abstract, see NSA 21 18.
LA-3600 HC$3.00 MF$0.65

20D. Fluid Mechanics

AN ANALYSIS OF TWO-DIMENSIONAL LAMINAR AND TURBULENT COMPRESSIBLE MIXING.
Technical rept.,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
R. C. Bauer. Apr 65, 19p AEDC-TR-65-84
Contract AF 40 (600)-1000
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Jet mixing flow, Two-dimensional flow), (*Laminar flow, Compressible flow), (*Turbulence, Compressible flow), Equations of motion, Shear stresses, Mathematical analysis.

An analysis is presented of two-dimensional, isoenergetic, compressible mixing of a jet with a fluid at rest for both laminar and turbulent mixing. The analysis is primarily concerned with the development of theoretical expressions for the mixing similarity parameters. A general momentum equation is derived, which relates the similarity parameter to the mixing length and viscous shear stress. Bu using this general equation and Newton's viscous shear relation, a complete theoretical solution for the laminar mixing similarity parameter is derived, which does not involve a reference perturbation velocity factor. Prandtl's mixing length theory for the apparent viscous shear relation is used to obtain the theoretical similarity parameter for turbulent mixing. Based on these similarity parameters, equations for the width of the corresponding mixing regions are derived. These results and the approximate theoretical velocity profile equation developed by Pai, Nash, and Korst represent a closed-form theoretical approximation of the type of mixing considered. (Author)
AD-462 207 HC$3.00

COMPRESSIBLE FLOW IN PRESSURIZED COMMUNICATION CABLE,
Scott Corp., Houston, Tex.
For primary bibliographic entry see Field 9A.
AD-479 564 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME I. PROPELLER AND ROTOR AERODYNAMICS. HELD JUNE 22, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 562 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME II. PROPULSION AND INTERFERENCE AERODY-

NAMICS. HELD JUNE 23, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 563 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME III. AERODYNAMIC RESEARCH ON BOUNDARY LAYERS. HELD JUNE 24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 564 HC$3.00 MF$0.65

CAL/USAAVLABS SYMPOSIUM PROCEEDINGS. AERODYNAMIC PROBLEMS ASSOCIATED WITH V/STOL AIRCRAFT. VOLUME IV. PANELS ON RECOMMENDED V/STOL AERODYNAMIC RESEARCH, PANEL SUMMARIES, FEATURED SPEAKERS, AND TECHNICAL PAPER DISCUSSIONS. HELD JUNE 22-24, 1966, STATLER-HILTON HOTEL, BUFFALO, NEW YORK.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-657 565 HC$3.00 MF$0.65

ON A QUASI-LINEAR ELLIPTIC EQUATION ARISING IN THE THEORY OF NON-NEWTONIAN FLUIDS.
Wisconsin Univ Madison Mathematics Research Center
For primary bibliographic entry see Field 12A.
AD-657 572 HC$3.00 MF$0.65

A PHENOMENOLOGICAL THEORY OF QUASI-PARALLEL TURBULENT SHEAR FLOWS.
Interim technical rept.,
Johns Hopkins Univ Baltimore Md Dept of Mechanics
Victor W. Nee, and Leslie S. G. Kovasznay. Jul 67, 117p Rept no. 1
AROD-5413:2-E
Contract DA-31-124-ARO (D)-313

Descriptors: (*Fluid flow, Shear stresses), (*Turbulence, Equations of motion), Boundary layer, Two-dimensional flow, Prandtl number, Walls, Mathematical analysis, Reviews.
Identifiers: Shear flow.

Mean velocity and mean shear stress distributions of two-dimensional quasi-parallel turbulent shear flows are calculated using the assumption that the effective turbulent viscosity obeys a 'rate equation'. The effects of generation, convection, diffusion and decay are each represented by the appropriate terms in that 'rate equation'. Thus, together with the equation of motion, they form a closed system for the two dependent variables; the effective viscosity and the mean velocity. For a newly homogeneous domain, Prandtl's mixing length theory can be shown to be a limiting case. Solutions were obtained for the case of the turbulent non-turbulent interface at the outer edge of the boundary layer. Finally, similarity solutions for the incompressible turbulent boundary layers with zero pressure gradient were calculated, assuming the linear growth of the turbulent boundary layer thickness with an additional simple assumption concerning the approximation of the convection terms. The resulting system of non-linear ordinary differential equations were integrated by the use of an analogue computer. The calculated distributions of the mean velocity, total shear stress and turbulent viscosity were compared with experiments. (Author)
AD-657 602 HC$3.00 MF$0.65

LINEAR DAMPING CHARACTERISTICS OF OSCILLATING RECTANGULAR FLAT PLATES AND THEIR EFFECT ON A CYLINDRICAL FLOAT IN WAVES,
Stevens Inst of Tech Hoboken N J Davidson Lab
Charles J. Henry. Jun 67, 75p Rept no. 1183
Contracts NOw-65-0314, N600 (19)62900

Descriptors: (*Flat plate models, *Drag), (*Floats, Fluid dynamic properties), Oscillation, Aspect ratio, Buoyancy, Damping, Cylindrical bodies, Linear systems, Water waves, Equations of motion.

The linear viscous-drag coefficients of rectangular flat plates oscillating in the direction normal to their plane surfaces were obtained from experiments over a range of frequency and aspect ratio, with holes of various numbers and sizes cut in the plates. The effect of the number of holes on the drag coefficient is not as significant as the solidity and the aspect ratio. A solidity of 0.8, together with aspect ratios 1 or 2, seems to give the highest value of drag coefficient. A cursory study of the wave exciting force on a plate-float combination indicates that the added-mass force on the plate tends to cancel the bouyant force on the float. The canceling effect of the plate can be controlled by its size and depth of submersion, so that it seems feasible to find a plate-float combination together with a float support configuration which will tend to minimize the motions of a vehicle floating in a specified seaway. (Author)
AD-657 636 HC$3.00 MF$0.65

A SHEAR-FREE TURBULENT BOUNDARY LAYER.
Revised ed.,
Stanford Univ Calif Dept of Mechanical Engineering
T. Uzkan, and W. C. Reynolds. 17 Oct 66, 21p
AFOSR-67-2009
Contract AF 49 (638)1278
Revision of manuscript received 19 Apr 66.
Availability: Published in Journal of Fluid Mechanics v28 pt4 p803-21 1967.

Descriptors: (*Turbulent boundary layer, Interactions), Walls, Damping, Flat plate models, Probes, Flow visualization.

A simple wall-turbulence interaction was studied experimentally. In the idealized model an infinite flat plate is suddenly inserted into a pre-existing field of homogeneous isotropic turbulence, and subsequent changes in the turbulence field examined. The experiment involved passing grid-produced turbulence over a wall moving at the mean speed. Mean velocity gradients vanish in both the model and experiment, and hence production of new turbulence is absent. This allowed the inhibiting effects of the wall to be studied separately. The growth of the 'inhomogeneity layer' into the impressed turbulence field and other statistical features of the turbulence field and other statistical features of the turbulence were measured. (Author)
AD-657 648 Not available from CFSTI.

DETERMINATION OF THE THERMAL ACCOMMODATION COEFFICIENTS OF GASES ON CLEAN SURFACES AT TEMPERATURES ABOVE 300K BY THE TEMPERATURE JUMP METHOD,
Missouri Univ Columbia Dept of Chemistry
For primary bibliographic entry see Field 20M.
AD-657 661 Not available from CFSTI.

ELECTRODYNAMICS OF MOVING MEDIA.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-657 672 Not available from CFSTI.

EQUAL PRESSURE DIFFUSION AND GRAHAM'S LAW,
Maryland Univ College Park Inst for Molecular Physics
E. A. Mason. 28 Sep 66, 4p
AROD-5366:5
Grant DA-ARO (D)-31-124-G617
Availability: Published in American Journal of Physics v35 n5 p434-5 May 1967.

Descriptors: (*Diffusion, *Gases), Pressure, Porous materials, Superaerodynamics, Hydrodynamics, Gas flow.
Identifiers: Hoogschagen phenomenon, Graham's law.

In 1953 Hoogschagen published a research note describing experiments on the interdiffusion of pairs of gases through a porous plate, under conditions of constant total pressure. The unexpected result indicated that the square-root law held in the transition and hydrodynamic regimes, as well as in the free-molecular regime. The note points out that the Hoogschagen phenomenon was in fact discovered in 1833 by Graham. (Author)
AD-657 719 Not available from CFSTI.

FURTHER EXPERIMENTAL RESULTS FOR THREE-DIMENSIONAL FREE JETS.
Revised ed.,
Polytechnic Inst of Brooklyn Farmingdale N Y
Nicholas Trentacoste, and Pasquale Sforza. 15 Nov 66, 7p
AFOSR-67-1997
Contract AF 49 (638)-1623
Revision of manuscript submitted 2 Aug 66.
Availability: Published in AIAA Journal v5 n5 p885-91 May 1967.

Descriptors: (*Jets, Three-dimensional flow), Turbulence, Incompressible flow, Momentum, Mass transfer.

The paper presents a succinct exposition of further investigations into the bulk properties of three-dimensional, turbulent, incompressible jets, supplementing earlier research. Additional remarks based on recent experiments are made with regard to the axis velocity decays, the three flow regions, half-width boundaries, velocity profile similarity, approach to axisymmetry, mass entrainment, and momentum conservation and velocity irregularities in three-dimensional jets. (Author)
AD-657 723 Not available from CFSTI.

PLANAR FREE TURBULENT MIXING WITH AN AXIAL PRESSURE GRADIENT,
General Applied Science Labs Inc Westbury N Y
J. A. Schetz, and J. Jannone. 2 Feb 67, 8p Rept no. GASL-Paper-67-FE-9
AFOSR-67-2000
Contract AF 49 (638)-1503
Availability: Published in Proceedings of Fluids Engineering Conference May 8-11 1967.

Descriptors: (*Jet mixing flow, Incompressible flow), Turbulence, Flow fields, Momentum, Pressure, Numerical analysis.

An analysis of incompressible free turbulent mixing processes considering either a velocity defect or excess and both favorable and adverse pressure gradients is presented. The full nonsimilar flow field is treated directly by employing a linearized approximation to the momentum equation in the von Mises plane with the total pressure as the dependent variable. A 'universal' solution results which can be used to determine the velocity field for any particular pressure gradient by simple algebraic manipulation. Satisfactory agreement with experimental data is shown, and some parametric studies of pressure gradient effects are presented. (Author)
AD-657 725 Not available from CFSTI.

THE LAMINAR-BOUNDARY LAYER WITH LARGE PRESSURE GRADIENT AND SURFACE MASS TRANSFER,
Rand Corp Santa Monica Calif
C. F. Dewey, Jr., and J. F. Gross. Aug 67, 32p Rept no. P-3506

Descriptors: (*Laminar boundary layer, Aerodynamic characteristics), Momentum, Skin friction, Pressure, Mass transfer, Prandtl number, Leading edge, Heat transfer, Equations.

For large values of the pressure-gradient parameter beta (i.e., highly accelerated flows), the order of the similarity equations governing the laminar boundary layer is reduced by two. Coles has shown that this is a singular perturbation problem for which an inner solution and an outer solution must be obtained. In the paper, inner and outer solutions are presented which include the effects of a power-law temperature-viscosity relation, nonunit Prandtl number, leading-edge sweep, and surface mass transfer. An extremely accurate method is described for estimating skin friction and heat transfer for all positive values of beta. (Author)
AD-657 749 HC$3.00 MF$0.65

GENERALIZED PRANDTL-MEYER WAVES IN RELAXATION HYDRODYNAMICS,
Michigan Univ Ann Arbor
N. Coburn. 9 Nov 65, 19p
AFOSR-67-1992
Grant AF-AFOSR-20-63
Availability: Published in Quarterly of Applied Mathematics v25 n2 p147-62 Jul 1967.

Descriptors: (*Hydrodynamics, Nonequilibrium flow), Equations of motion, Three-dimensional flow, Cylindrical bodies, Relaxation time, Density, Entropy.

Three topics are discussed in the paper: (1) the intrinsic forms (expressed in characteristic variables) of the basic equations of relaxation (nonequilibrium) hydrodynamics for three-dimensional, steady flows; (2) the particular form of the above relations when the characteristic surfaces are a one-parameter family of planes which envelope a right cylinder and the bicharacteristics are either radial or parallel lines in each characteristic plane; (3) three families of solutions of these last relations. (Author)
AD-657 766 Not available from CFSTI.

RESTRICTED VARIATIONAL PRINCIPLE METHOD FOR THE PREDICTION OF LOW-DENSITY TRANSITIONAL REGIME CONE DRAG,
Aerospace Corp El Segundo Calif Labs Div
Charles R. Ortloff. Jun 67, 32p Rept no. TR-1001 (2240-20)-19
SSD-TR-67-134
Contract AF 04 (695)-1001

Descriptors: (*Conical bodies, *Drag), (*Hypersonic flow, Slender bodies), Boundary layer transition, Distribution functions, Boundary value problems, Density.

Rosen's restricted variational principle representation of the Boltzmann equation was applied to the problem of determining the transitional regime low-density hypersonic flow over slender conical vehicles with diffusely reflecting surfaces. By means of a suitable choice of a trial distribution function, the Euler-Lagrange equations derived from Rosen's functional result in a semilinear hyperbolic system amenable to solution by classical characteristics methods. Sample calculations are given and compared with the low-density cone flow experiments of Hickman for assessment of the accuracy of the method presented. It is believed that this method constitutes the first solution method for boundary value problems in the low-density transitional flow regime. (Author)
AD-657 767 HC$3.00 MF$0.65

AIR AND NITROGEN CONDENSATION IN HYPERSONIC NOZZLE FLOW,
Aerospace Research Labs Wright-Patterson AFB Ohio
Fred L. Daum, and George Gyarmathy. Mar 67, 67p Rept no. ARL-65-159

Descriptors: (*Nozzle gas flow, *Condensation), (*Air, Condensation), (*Nitrogen, Condensation), (*Hypersonic flow, Condensation), Nucleation, Hypersonic wind tunnels, Supercooling, Stagnation point, Oxygen, Carbon dioxide, Water.

Earlier experimental air condensation results were extended to lower pressures and higher Mach numbers where it was found that air behaves essentially as pure nitrogen and large amounts of supercooling are obtained. A theoretical analysis, based on established drop growth and self-nucleation concepts, supported the experimental findings. A correlation parameter governing the onset of condensation is presented. The analysis indicated that at the higher static pressures, where little or no supercooling is observed experimentally, the seemingly negligible amounts of CO2 and H2O in the wind tunnel air are sufficient to cause O2 and N2 condensation through a seeding action. A new method is presented for determining a conservative value of minimum stagnation temperature for obtaining condensation-free hypersonic flow. (Author)
AD-657 772 HC$3.00 MF$0.65

RESEARCH ON ADVANCED GASDYNAMICS TEST FACILITIES.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 14B.
AD-657 775 HC$3.00 MF$0.65

THE EFFECT OF INCLINATION ON THE STROUHAL NUMBER AND OTHER WAKE PROPERTIES OF CIRCULAR CYLINDERS AT SUBCRITICAL REYNOLDS NUMBERS.
Technical note,
Toronto Univ (Ontario) Inst for Aerospace Studies
J. Surry, and D. Surry. Aug 67, 52p Rept no. UTIAS-TN-116
Contract AF 33 (615)-2305

Descriptors: (*Cylindrical bodies, *Wake), Reynolds number, Vortices, Turbulence, Mathematical analysis, Canada.
Identifiers: Strouhal number.

A brief experimental investigation was made to determine the effect of inclination on the Strouhal Number of circular cylinders at Reynold's numbers from 4,000 to 65,000. It was found that the Strouhal Number based on the normal velocity component remained constant to a good approximation. Spectral techniques showed that the energy of the shed vortices dispersed in frequency and decreased in significance with increasing inclination, such that for angles less than 40 degrees the shedding energy was negligible compared to the general wake turbulence energy, at 7.5 diameters downstream from the cylinder. Other wake properties were briefly investigated. These included the decay of the u-component of turbulence downstream and the behaviour of the wake spectra with inclination, speed and wake location. (Author)
AD-657 779 HC$3.00 MF$0.65

AN ANALYSIS OF THE INTERACTION OF A BOUNDARY LAYER AND THE CORNER-EXPANSION WAVE IN SUPERSONIC FLOW.
Technical note,
Toronto Univ (Ontario) Inst for Aerospace Studies
P. H. Oosthuizen. Aug 67, 143p Rept no. UTIAS-TN-117
AFOSR-67-1533
Grant AF-AFOSR-365-66

Descriptors: (*Boundary layer, Curved profiles), (*Supersonic characteristics, Interactions), Laminar boundary layer, Turbulent boundary layer, Numerical analysis, Equations of motion, Canada.
Identifiers: Curved flows.

A theoretical study of the effects of the wall boundary layer on the supersonic flow around a sharp convex corner is presented. Fundamentally different methods of analysis are adopted for laminar and for turbulent boundary layers. In the case of interactions involving laminar boundary layers, an analysis based on the use of classical boundary layer theory is used. Results of numerical calculations carried out using this analysis to predict the effects of the major governing parameters are presented. In all cases, a considerable upstream and downstream influence is predicted. A simplified form of this analysis, closely related to that of Curle, is also presented, this analysis leading to a simple set of explicit equations describing the flow quantities in the interaction region. Comparison of the simplified analysis with results obtained from the full analysis indicated, as is to be expected, that the simplified analysis will only give acceptable results for small expansion angles and moderate Mach numbers. In the case of turbulent boundary layer interactions, an analysis based on the assumption that there is no upstream influence and that the major portion of the expansion occurs in an effectively inviscid manner is adopted, the flow properties being calculated by the method of rotational characteristics. (Author)
AD-657 780 HC$3.00 MF$0.65

BIBLIOGRAPHY OF HYDRODYNAMIC ENTRANCE REGION FLOW.
Special rept.,
Kansas State Univ Manhattan
L. T. Fan, and C. L. Hwang. Mar 66, 23p Rept no. SR-67
AFOSR-67-2022
Grant AF-AFOSR-463-66

Descriptors: (*Hydrodynamics, Bibliographies), Pipes, Ducts, Equations of motion, Walls, Pressure, Velocity.

The bibliography, containing 145 references, of hydrodynamic entrance region flow is intended to be a thorough review and classification of the literature on the subject which has appeared in the last hundred years.
AD-657 792 HC$3.00 MF$0.65

THEORY OF GAS-SURFACE COLLISIONS,
Massachusetts Inst of Tech Cambridge Fluid Dynamics Research Lab
For primary bibliographic entry see Field 7D.
AD-657 795 HC$3.00 MF$0.65

TEST SECTION CONDITIONS FOR THE TAILORED INTERFACE HYPERSONIC SHOCK TUNNEL,
Sheffield Univ (England) Dept of Fuel Technology and Chemical Engineering
M. P. Wood. 1966, 27p Rept no. HIC-83-App
AFOSR-67-2026
Grant AF-EOAR-11-66

Descriptors: (*Shock tubes, Hypersonic flow), Mach number, Stagnation point, Hydrogen, Helium, Oxygen, Great Britain.

The report contains calculated conditions expected in the test section of the Sheffield University Shock Tunnel. The driver gases used are either cold hydrogen or a mixture of hydrogen oxygen and helium ignited behind the primary diaphragm. Cold hydrogen 'Tailors' at a primary shock Mach number of 6 and the helium mixture used at about 12. The report therefore deals with the primary shock Mach number ranges from 5 to 9 and from

9 to 14 to cover both these cases. The air in the stagnation region is expanded to test section Mach numbers of 3, 4 and 5 depending on the nozzle attached. (Author)
AD-657 796 HC$3.00 MF$0.65

STABILITY OF TURBULENT CHANNEL FLOW, WITH APPLICATION TO MALKUS'S THEORY,
Stanford Univ Calif Dept of Mechanical Engineering
W. C. Reynold, and W. G. Tiederman. 28 Mar 66, 21p
AFOSR-67-2063
Contract AF 49(638)-1278
Prepared in cooperation with Shell Development Co., Emeryville, Calif.
Availability: Published in J. Fluid Mech. v27 pt2 p253-72 1967.

Descriptors: (*Turbulence, Fluid flow), (*Fluid flow, Stability), Theory, Reynolds number, Boundary value problems, Velocity.
Identifiers: Malkus's theory, Poiseuille flow.

The Orr-Sommerfeld stability problem was studied for velocity profiles appropriate to turbulent channel flow. The intent was to provide an evaluation of Malkus's theory that the flow assumes a state of maximum dissipation, subject to certain constraints, one of which is that the means velocity profile is marginally stable. Dissipation rates and neutral stability curves were obtained for a representative two-parameter family of velocity profiles. Those in agreement with experimental profiles were found to be stable; the marginally stable profile of greatest dissipation was not in good agreement with experiments. An explanation for the apparent success of Malkus's theory is offered. (Author)
AD-657 889 Not available from CFSTI.

STABILIZATION OF HELICAL MODES BY MAGNETIC WELLS,
General Dynamics San Diego Calif General Atomic Div
For primary bibliographic entry see Field 20I.
AD-657 892 Not available from CFSTI.

DIRECT MEASUREMENT OF FIRST COLLISION EFFECTS IN RAREFIED HIGH SPEED FLOWS,
Von Karman Inst for Fluid Dynamics Rhode-Saint-Genese (Belgium)
J. J. Smolderen. 5 Sep 67, 10p
AFOSR-67-2059
Grant AF-EOAR-16-66
Availability: Published in Rarefied Gas Dynamics, v2 n5 p1519-26 1967.

Descriptors: (*Superaerodynamics, Measurement), Wind tunnels, Density, Momentum, Transducers, Measurement, Accuracy, Modulation, Instrumentation.

Wind tunnel experiments have been designed with a view to obtaining a direct measurement of first collision effects in the rarefied high speed flow of the VKI low density wind tunnel. The experiments consist in observing the variation of mass and momentum fluxes recorded by hot wire or force transducer probes, caused by the interference from a small flat plate placed normal to the flow and slightly upstream of the probes. The modulation technique of measurement developed at VKI is used, the modulation being obtained by periodically removing the interacting flat plate. A direct reading of the first collision effect is thereby obtained. (Author)
AD-657 914 Not available from CFSTI.

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. I. THEORY FOR VARIABLE PROPERTY FLOW,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
D. R. Kassoy. 24 Oct 66, 11p
AFOSR-67-2065
Grant AF-AFOSR-927-66
See also AD-657 920.
Availability: Published in The Physics of Fluids v10 n5 p938-46 May 1967.

Descriptors: (*Cylindrical bodies, *Heat transfer), Reynolds number, Theory, Anemometers, Flow fields, Gas flow, Equations, Drag.

The low Reynolds number flow past a heated infinite cylinder is studied for cases involving significant variation of fluid properties, and when thermal and velocity slip is present at the wall. Initially, the inner and outer asymptotic expansions for the flow field variables are derived for an arbitrary thermal conductivity-temperature relationship. It is shown that the continuum and slip Oseen-type analyses of Cole and Roshko, and Levey, respectively, are zeroth-order approximations for the Nusselt number in the limit tau approaches 0. The zeroth-order drag coefficient is also given in the form C sub (Do) = C sub (Do) (Re, tau, omega, f), where f is the velocity slip parameter. (Author)
AD-657 919 Not available from CFSTI.

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. II. EXPERIMENTAL RESULTS AND COMPARISON WITH THEORY,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
Y. Aihara, D. R. Kassoy, and Paul A. Libby. 24 Oct 66, 8p
AFOSR-67-2061
Grant AF-AFOSR-927-66
See also AD-657 919.
Availability: Published in The Physics of Fluids v10 n5 p947-52 May 1967.

Descriptors: (*Cylindrical bodies, *Heat transfer), Reynolds number, Nitrogen, Helium, Mixtures, Theory, Anemometers.
Identifiers: Thermal accommodation coefficients.

The heat loss from wires in nitrogen, helium, and mixtures thereof was measured at low Reynolds numbers and was compared with the theory of Kassoy. The data in nitrogen agree well with previous data and with the theory for continuum flow and validate the experimental techniques. The helium data exhibit large slip effects at low Knudsen numbers due to the low thermal accommodation coefficient of helium; good agreement with the theory of Kassoy for slip effects is found. Some data exhibiting slip in helium-nitrogen mixtures are given. A mixture rule for the effective thermal accommodation coefficient in binary mixtures is suggested. (Author)
AD-657 920 Not available from CFSTI.

TENSION IN A CABLE TOWING A HEAVY WEIGHT THROUGH A FLUID.
David Taylor Model Basin Washington D C
Mar 41, 5p Rept no. DTMB-33

Descriptors: (*Towing cables, Drag), Fluid mechanics, Towed bodies, Force (Mechanics), Mathematical analysis, Weight.

Computations are presented for determining the drag coefficient of a towing cable.
AD-657 937 HC$3.00 MF$0.65

EXPLOSION PRODUCT REDISTRIBUTION MECHANISMS FOR SCALED MIGRATING UNDERWATER EXPLOSION BUBBLES,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 19D.
AD-657 939 HC$3.00 MF$0.65

NOZZLE FLOWS WITH COUPLED VIBRATIONAL AND DISSOCIATIONAL NONEQUILIBRIUM,
Toronto Univ (Ontario) Inst for Aerospace Studies
Duvvuri Tirumalesa. Aug 67, 174p Rept no. UTIAS-123
Contract NsG-633

Descriptors: (*Nozzle gas flow, *Nonequilibrium flow), Dissociation, Relaxation time, Atomic energy levels, Molecular energy levels, Equations of motion, Thermodynamics, Reaction kinetics, Shock tubes, Vibration, Probes, One-dimensional flow, Hypersonic flow, Canada.

It was assumed that the vibrational state of the gas may be represented by a single vibrational temperature and that the effect of vibrational nonequilibrium on rates of dissociation may be taken into account by the introduction of a parameter which has the dimensions of temperature and which gives a higher probability for dissociation from higher vibrational energy levels. The dependence of this parameter on translational temperature is derived. However, in the calculations, an averaged constant value of this parameter is used as a simplification. The effect of dissociational nonequilibrium on vibrational relaxation is to modify the classical Landau-Teller equation by additional terms which take into account the average energy lost or gained due to dissociation and recombination. A qualitative study of the effects of the atom-molecule exchange reaction and relaxation from a higher to lower vibrationally excited state on the vibrational relaxation is carried out by shortening the vibrational relaxation times from those measured behind normal shocks. The analysis was successfully applied to predict the hypersonic nozzle test-section conditions for a newly developed UTIAS self-calibrating catalytic probe for measuring local atom concentrations in a dissociating oxygen flow. (Author)
AD-657 944 HC$3.00 MF$0.65

VISCOUS FLOW IN A CYLINDRICAL TUBE CONTAINING A LINE OF SPHERICAL PARTICLES.
Technical rept.,
Columbia Univ New York Dept of Civil Engineering and Engineering Mechanics
Henry Wang, and Richard Skalak. Jul 67, 75p
Rept no. TR-1
Contract N00014-67-A-0108-0003

Descriptors: (*Fluid flow, Viscosity), Fluids, Pressure, Spheres, Particles, Blood, Capillaries, Sedimentation, Cylindrical bodies, Drag.

Three cases of viscous flow in a circular cylindrical tube containing an infinite line of spherical particles equally spaced along the axis of the tube are considered: axial translation of the particles, flow past a line of stationary particles, flow of fluid and particles under an imposed pressure gradient. The fluid is taken to be incompressible, Newtonian and the linearized equations of creeping flow are used. The case is an idealization of blood flow in capillaries where the diameter of the red blood cells is of the same order as the diameter of the capillary itself. The results may also be of interest in sedimentation, fluidized beds, and groundwater flow. An exact solution in the form of an infinite series of singularities at the center of each sphere is developed and evaluated numerically for a range of sphere radius to tube radius of zero to 0.9. The drag on each sphere, the pressure drop and typical streamline patterns are given. The results show that the drag and pressure drop for a given size of sphere decrease as the spacing between spheres increases and for spacings more than one tube diameter, there is little interaction between spheres. (Author)
AD-657 956 HC$3.00 MF$0.65

ON CONCAVE BODIES IN FREE MOLECULAR FLOW,
Rand Corp Santa Monica Calif
R. Schamberg. Aug 67, 35p Rept no. P-3164-1

Descriptors: (*Superaerodynamics, Curved profiles), Drag, Heat transfer, Mathematical analysis, Heat transfer coefficients, Cylindrical bodies, Spheres.
Identifiers: Concave bodies, Thermal accommodation coefficients.

Data on drag of concave surfaces are represented. 'Unshielded' concave surfaces are considered, for which the entire surface is exposed to the incident free molecule flow. The effect on free molecule drag of shielding a portion of the concave surface from the incident flow is illustrated. From a practical point of view, free molecule flow over concave bodies is of interest for possible applications including parachute-like drogue devices, high altitude air collectors or induction systems for propulsion systems, pressure probes, etc.
AD-658 013 HC$3.00 MF$0.65

AXISYMMETRIC HYPERSONIC FLOW WITH STRONG VISCOUS INTERACTION,
Aerospace Corp El Segundo Calif Labs Div
John Webster Ellinwood, and Harold Mirels. Jul 67, 46p Rept no. TR-1001 (2240-10)-11
SSD-TR-67-142
Contract AF 04(695)-1001

Descriptors: (*Hypersonic flow, Axially symmetric flow), Interactions, Shock waves, Prandtl number, Numerical analysis, Viscosity, Slender bodies, Equations of motion.

Stewartson's theory for axisymmetric hypersonic flow of a model gas with strong viscous interaction and strong shock wave is extended to power-law viscosity variation, nonunit Prandtl number, and body shapes other than power laws. For power-law bodies, the generalized theory is obtained in closed form without recourse to numerical integration. In addition, numerical computations are presented for axisymmetric flow over a three-quarter power-law body with strong shock wave and viscous interactions that range from weak to strong. (Author)
AD-658 024 HC$3.00 MF$0.65

INTERACTION BETWEEN AN INSTRUMENT CAVITY AND A FLOW OF RAREFIED GAS.
Research trans.,
American Meteorological Society Boston Mass
A. I. Ivanovskii. Jul 67, 71p Rept no. T-R-659
TT-67-62820
Contract AF 19(628)-3880
Nekotorye Voprosy Vzaimodeistviya Izmeritelnoi Polosti s Potokom Razrezhennogo Gaza, trans. of Tsentralnaya Aerologicheskaya Observatoriya. Trudy (USSR), p49-96 1964.

Descriptors: (*Superaerodynamics, Interactions), Meters, Meteorological instruments, Dissociation, Particles, Walls, Density, Scattering, USSR.

The article concerns problems of the interaction between the cavity of a measuring instrument and a flow of rarefied gas. The admittance of a cylindrical tube is computed both for the instrument at rest and for an axial oncoming flow. The admittance and a number of other characteristics are calculated for a rigid tube with dissociation of the particles at the walls. Formulas are derived for the density of a gas inside moving instruments of the simplest design. (Author)
AD-658 028 HC$3.00 MF$0.65

THE INFLUENCE OF ROTATION ON FLOW IN A LONG RECTANGULAR CHANNEL: AN EXPERIMENTAL STUDY,
Stanford Univ Calif Thermosciences Div
R. M. Halleen, and J. P. Johnston. May 67, 195p Rept no. MD-18
AFOSR-67-2050
Contract AF 49(638)-1278, Grant NSF-GP-655

Descriptors: (*Vortices, Rectangular bodies), Rotation, Walls, Reynolds number, Leading edge, Trailing edge, Flow fields.

An investigation is reported of the flow regimes and structures in flow through a rectangular channel rotating about an axis perpendicular to the relative velocity vector of the narrow walls of the channel. Flow regimes for the wall layers of the leading and trailing surfaces as functions of the Reynolds Number and a nondimensional rotation parameter are delineated. Flow regime data were obtained primarily from wall-slot dye injection and photography. Mean velocity profiles, wall shear, and reduced pressure across the channel are also given. For no rotation, the flow had a fully developed turbulent mean velocity profile for all cases investigated. As the speed of rotation is increased, important changes in the wall structures, shear, and mean velocity profiles are observed on both walls. (Author)
AD-658 055 HC$3.00 MF$0.65

EFFECT OF A PROBE ON THE DRAG AND PRESSURE DISTRIBUTION OF A HEMISPHERICAL NOSE,
General Dynamics/Pomona Calif
For primary bibliographic entry see Field 16B.
AD-658 157 HC$3.00 MF$0.65

THE HIGH MACH NUMBER RAYLEIGH PROBLEM ACCORDING TO THE KROOK MODEL,
Columbia Univ New York
C. K. Chu. 1967, 19p
AFOSR-67-2082
Contract AF 49(638)-1634
Availability: Published in Rarefied Gas Dynamics 5th Symposium v1 p589-605 1967.

Descriptors: (*Flat plate models, *Fluid flow), (*Boundary layer, Kinetic theory), Boundary value problems, Initial value problems, Mach number, Distribution functions, Shock waves, Superaerodynamics.
Identifiers: Rayleigh problem.

The classical Rayleigh problem--flow generated by a plate sliding parallel to itself--is studied, using the Krook equation of kinetic theory. The equation is solved numerically and a shock wave is formed and propagates perpendicular to the plate. The classical results of fluid dynamics, including boundary layer formation, heating in the shock wave, etc., as well as the free molecular gas results, are recovered at long time and short time, respectively. The paper gives the correct transition between the two. (Author)
AD-658 254 Not available from CFSTI.

LINEAR THEORY OF ROTATING STRATIFIED FLUID MOTIONS,
Massachusetts Inst of Tech Cambridge Dept of Mathematics
V. Barcilon, and J. Pedlosky. 9 Jun 66, 18p
AFOSR-67-2121
Grants AF-AFOSR-492-66, NSF-GP-4321
Availability: Published in J. Fluid Mech. v29 pt1 p1-16 1967.

Descriptors: (*Boundary layer, *Vortices), Fluid flow, Rotation, Linear systems, Equations of motion, Motion.
Identifiers: Stratified media.

A linear theory for steady motions in a rotating stratified fluid is presented, valid under the assumption that epsilon<E, where epsilon and E are respectively the Rossby and Ekman numbers. The fact that the stable stratification inhibits vertical motions has important consequences and many features of the dynamics of homogeneous rotation fluids are no longer present. For instance, in addition to the absence of the Taylor-Proudman constraint, it is found that Ekman layer suction no longer controls the interior dynamics. In fact, the Ekman layers themselves are frequently absent. Furthermore, the vertical Stewartson boundary layers are replaced by a new kind of boundary layer whose structure is characteristic of rotating stratified fluids. The interior dynamics are found to be controlled by dissipative processes. (Author)
AD-658 267 Not available from CFSTI.

LIMITING RELATION FOR THE EDDY DIFFUSIVITY CLOSE TO A WALL.
Illinois Univ Urbana
For primary bibliographic entry see Field 7A.
AD-658 281 Not available from CFSTI.

THE INFLUENCE OF VIBRATIONS ON THE FLOW FIELD BEHIND A CYLINDER,
Boeing Scientific Research Labs Seattle Wash Flight Sciences Lab
O. H. Wehrmann. May 67, 19p Rept no. D1-82-0619, 115
Prepared for publication in 'Physics of Fluids' at Int. Sym on Boundary Layers and Turbulence, Sep 66, Kyoto (Japan).

Descriptors: (*Cylindrical bodies, *Wake), (*Flow fields, Vibration), Oscillation, Vortices, Reynolds number.

The range of the forced oscillations behind a vibrating cylinder and the amplitude and phase distributions were measured for a Reynolds number range between 8-350. The distribution of the peak amplitude of the velocity fluctuations indicates three different flow modes depending on the Reynolds number. (Author)
AD-658 287 HC$3.00 MF$0.65

NONGRAY RADIATIVE TRANSFER EFFECTS ON THE RADIATING STAGNATION REGION SHOCK LAYER AND STAGNATION POINT HEAT TRANSFER,
Naval Ordnance Lab White Oak Md
John D. Anderson, Jr. 10 Jul 67, 89p Rept no. NOLTR-67-104, Aerodynamics Research-281

Descriptors: (*Atmosphere entry, Thermal radiation), (*Heat transfer, Stagnation point), Absorption, Shock waves, Reentry vehicles, Gas flow, Thermodynamics.

An analysis is presented for the radiative cooling and nongray self-absorption effects on the radiating stagnation region shock layer and heat transfer using approximate nongray step models for the absorption coefficient. The results lend support to the potential use of simple step model absorption coefficients in lieu of detailed spectral variations for making engineering calculations. (Author)
AD-658 321 HC$3.00 MF$0.65

MEASUREMENTS OF HYPERSONIC TURBULENT HEAT TRANSFER ON A HIGHLY COOLED CONE,
Naval Ordnance Lab White Oak Md
Donald M. Wilson. 17 Jul 67, 63p Rept no. NOLTR-67-24, Aerodynamics Research-283

Descriptors: (*Conical bodies, *Heat transfer), (*Hypersonic flow, Heat transfer), Turbulent boundary layer, Cooling, Reynolds number, Slender bodies, Measurement.

Turbulent boundary layer heat transfer rates were measured on a thin-walled slender cone at a free-stream Mach number of 5.0. Wall to stagnation temperature ratios from 0.15 to 0.40 were obtained by pre-cooling the model using liquid nitrogen. Tests at a wide range of Reynolds numbers were conducted by varying the tunnel supply pressure; thus providing data for both laminar and mixed

laminar-turbulent types of boundary layers. The experimental results obtained were compared with existing theories which predict convective heat transfer coefficients. These comparisons indicate that the data corresponding to a 760R supply temperature verify the predictions of Winkler and Cha; however, data acquired at a supply temperature of 1160R substantiate the predictions of Spalding and Chi. (Author)
AD-658 322 HC$3.00 MF$0.65

HYDRODYNAMIC PRESSURE MEASUREMENTS OF THE VERTICAL WATER ENTRY OF A SPHERE,
Naval Ordnance Lab White Oak Md
W. R. Hoover, and V. C. D. Dawson. 26 Oct 66, 67p Rept no. NOLTR-66-70, Ballistics Research-161

Descriptors: (*Spheres, Water entry), (*Water entry, Pressure), Fluid dynamic properties, Aluminum, Cavitation, Impact, Momentum, Bubbles.

The phenomena associated with the vertical water entry of 2-inch-diameter aluminum spheres striking the water surface at 28 feet per second were investigated by the use of hydrophones placed below the water surface. The pressure recordings from the hydrophones were analyzed for the three distinct phases of the water-entry problem: namely, (1) impact phase, (2) cavity flow phase, and (3) cavity collapse. The impact phase was analyzed by means of a dipole theory and a momentum equation. The cavity flow phase was analyzed by the potential theory of a half-body placed in a uniform flow since the shape of the water-entry cavity is very similar to a half-body. A comparison of actual pressures recorded with those as predicted by the half-body theory show agreement within ten percent both outside and inside the cavity. (Author)
AD-658 323 HC$3.00 MF$0.65

LEADING-EDGE SPIKES TO REDUCE THE DRAG OF WINGS AT SUPERSONIC AIRSPEEDS,
David Taylor Model Basin Washington D C Aerodynamics Lab
Richard M. Hartley. Sep 57, 43p Rept no. Aero-925

Descriptors: (*Wings, *Drag), (*Spikes, Leading edge), Reduction, Supersonic characteristics, Airspeed, Lift, Reynolds number.

A 12-percent-thick section (NACA 0012) wing panel with leading-edge spikes was tested at a Mach number of 1.88 to determine whether the wing drag could be reduced in such a manner that the ratio of maximum lift coefficient at landing speed to minimum drag coefficient at high speed would compare favorably with the ratio obtained from a thin, high-speed wing. A 6-percent-thick high-speed wing section (NACA 65-006) was tested to provide comparison data for the thick wing. A drag reduction of 20 percent (compared to the plain wing) was obtained when spikes protruded forward ten times the leading-edge radius. This drag reduction was obtained with a spike spacing of 5 percent of the chord. This drag reduction was not enough to make the ratio of maximum lift coefficient to minimum drag coefficient for the thick wing compare favorably with that for the thin wing. (Author)
AD-658 330 HC$3.00 MF$0.65

UNSTEADY FORCE AND CAVITY CHARACTERISTICS FOR VENTILATED HYDROFOILS.
Project rept.,
Minnesota Univ Minneapolis St Anthony Falls Hydraulic Lab
J. M. Wetzel, and K. E. Foerster. Jun 67, 46p Rept no. 85
Contract Nonr-710 (48)

Descriptors: (*Hydrofoils, Fluid dynamic properties), Force (Mechanics), Cavitation, Lift, Trailing control surfaces, Oscillation, Stability.
Identifiers: Supercavitating hydrofoils.

Experimental measurements were made of the unsteady cavity and force characteristics for both forced and naturally ventilated hydrofoils of finite span submerged below a free surface. Unsteady cavity characteristics were studied for a force-ventilated wedge subjected to a sudden change in either the air flow rate to the cavity or angle of attack. Differences were observed in air entrainment rates measured for the unsteady case as compared to the corresponding instantaneous steady case. The magnitude of the differences depended on the kind of unsteadyness introduced. Unsteady force characteristics were determined for naturally ventilated foils undergoing either a sinusoidal heaving motion or a harmonic oscillation of a trailing edge flap. The amplitude of the oscillatory lift was found to increase with increasing reduced frequency for a heaving foil, whereas the oscillatory lift was essentially constant up to reduced frequencies of 1.2 for the foil with an oscillating flap. There is limited agreement of the data with available theory. (Author)
AD-658 341 HC$3.00 MF$0.65

WIND TUNNEL TESTS EMPLOYING TEMPOKAL AND SPATIAL VARIATIONS IN MASS TRANSFER DISTRIBUTION THROUGH A CONICAL SURFACE TO CONTROL AERODYNAMIC PITCHING MOMENT CHARACTERISTICS.
Final technical rept. 31 Jan 67,
Fluidyne Engineering Corp Minneapolis Minn
S. K. Ibrahim, K. W. Smith, R. B. Pollock, and C. D. Christopherson. 31 Mar 67, 92p Rept no. 0414-3-31-67
Contract Nonr-4624 (00), ARPA Order-576
Rept. on Stability of Re-entry Vehicle Models.

Descriptors: (*Pitch (Motion), Aerodynamic characteristics), (*Mass transfer, *Conical bodies), Control, Ablation, Atmosphere entry, Damping, Moments, Stability, Distribution, Wind tunnel models, Model tests, Reentry vehicles, Porous materials.

A unique apparatus was created which permits the support of a conical model in a hypersonic wind tunnel with small pitch damping due to the apparatus, and at the same time provides a means for blowing through four separate (aft, forward, top, bottom combinations) model surface areas. Tests were made without mass transfer, with mass transfer produced by a subliming material, and with mass transfer produced by blowing through a porous surface. These tests provided additional confirmation that mass transfer from a surface will, in itself, significantly influence the pitch damping characteristics of a conical shape, whether its origin is in a heat transfer related phenomenon (such as ablation or sublimation) or an independently controlled flow process such as is represented by blowing through the conical surface. In addition, these tests provided an opportunity for shakedown of the blowing flow control apparatus; however, it was not possible to carry the blowing study into the parametric investigation initially planned. (Author)
AD-658 344 HC$3.00 MF$0.65

EFFECTS OF ABLATION ON THE PITCHING MOMENT DERIVATIVES OF CONES IN HYPERSONIC FLOW,
Fluidyne Engineering Corp Minneapolis Minn
Shukry K. Ibrahim. 4 Apr 67, 109p Rept no. 0414-4-4-67
Contract Nonr-4624 (00), ARPA Order-576

Descriptors: (*Ablation, *Pitch (Motion)), (*Conical bodies, Hypersonic flow), Reentry vehicles, Atmosphere entry, Moments, Oscillation, Statics, Skin friction, Numerical analysis.

The work presents a method of calculating the static and dynamic pitching moment derivatives at hypersonic speeds for pointed or slightly blunted cones performing small-amplitude, single-degree-of-freedom oscillations about an arbitrary pivotal axis, taking into account the effects of ablation or blowing over all or specified portions of the cone surface. The study is motivated by the need for detailed understanding of the large destabilizing changes in the pitching oscillations sometimes observed on re-entry vehicle test flights. In the analysis, the ablation gases leaving the body are assumed to produce the following two-fold effect: (1) A deflection of the external flow which produces a change in the local static pressure coefficient readily calculated by the Newtonian flow theory and (2) a change in the local skin-friction coefficient. (Author)
AD-658 345 HC$3.00 MF$0.65

AN EXPERIMENTAL MODEL FOR THE SHARP LEADING EDGE PROBLEM IN RAREFIED HYPERSONIC FLOW,
Princeton Univ N J Gas Dynamics Lab
William J. McCroskey. Jun 66, 98p Rept no. 771
ARL-66-0101
Contract AF 33 (615)-3328

Descriptors: (*Leading edge, *Superaerodynamics), (*Hypersonic flow, Leading edge), Flat plate models, Shock waves, Boundary layer, Theory, Models (Simulations).

Flow field studies of the shock wave and boundary layer development on a sharp flat plate are presented for a region of rarefied flow that bridges the gap between a classical hypersonic boundary layer downstream and a kinetic flow model at the leading edge. The measurements give a comprehensive picture of the flow pattern in the 'merged layer' or 'viscous layer' regime, which exists upstream of the region of validity of hypersonic viscous interaction theory. The results are derived from a combination of several probing and optical techniques and surface pressure measurements. From the detailed measurements, a true scale physical model of the flow field is constructed for the merged layer regime. One of the main features of the model is a thick, curved shock wave which decreases in strength as the leading edge is approached, even though the shock angle increases. Density profiles across the shock and viscous layers show that the structure of the flow field is quite different from the classical picture of a hypersonic boundary layer beneath an oblique Rankine-Hugonio shock wave. (Author)
AD-658 390 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-658 392 HC$3.00 MF$0.65

A SENSITIVE MAGNETIC BALANCE FOR THE DIRECT MEASUREMENT OF SKIN FRICTION DRAG,
LTV Research Center, Dallas, Tex.
For primary bibliographic entry see Field 14B.
N64-19298 HC$3.00 MF$0.65

ON THE LAMINAR MOTION OF A FLUID NEAR AN OSCILLATING POROUS, INFINITE PLANE.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
W. B. Nicoll, A. B. Strong, and K. A. Woolner. Jan 67, 16p TN-1

Descriptors: *Harmonic oscillation, *Laminar flow, *Porous wall, Equation, Flow, Fluid, Har-

monic, Infinite, Laminar, Mass, Motion, Oscillation, Porosity, Transfer, Wall.

For abstract, see STAR 05 20.
N67-34029 HC$3.00 MF$0.65

ON THE NON-LINEAR THEORY OF WINGS OF SMALL ASPECT RATIO.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34099 HC$3.00 MF$0.65

PERFORMANCE OF THIN TURNING VANES IN SQUARE CONDUITS.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
S. Ahmed, and E. Brundrett. May 67, 56p RR-6 Contract DRG-G-9559-18

Descriptors: *Ducted flow, *Flow velocity, *Liquid flow, *Vane, Bending, Cascade, Cascade flow, Coefficient, Duct, Flow, Liquid, Loss, Optimum, Performance, Profile, Secondary, Tunnel, Turn, Velocity.

For abstract, see STAR 05 20.
N67-34109 HC$3.00 MF$0.65

ESTIMATION OF SHEAR STRESS AND HEAT TRANSFER FOR NON-SIMILAR, LAMINAR BOUNDARY LAYERS.
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34263 HC$3.00 MF$0.65

ROUGH TUBE FRICTION FACTORS AND HEAT TRANSFER COEFFICIENTS IN LAMINAR AND TRANSITION FLOW.
United Kingdom Atomic Energy Authority, Harwell (England). Chemical Engineering and Process Technology Div.
J. Molloy. Mar 67, 27p AERE-R-5415

Descriptors: *Flow measurement, *Friction coefficient, *Heat-transfer coefficient, *Laminar flow, *Pipeflow, Coefficient, Convection, Flow, Friction, Heat transfer, Laminar, Measurement, Nusselt number, Pressure, Reynolds number, Roughness, Smoothness, Stanton number, Transition, Turbulent.

For abstract, see STAR 05 20.
N67-34347 HC$3.00 MF$0.65

ON APPLYING FINITE ELEMENTS TO PANEL FLUTTER.
National Research Council of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34429 HC$3.00 MF$0.65

DESIGN OF A SUPERSONIC NOZZLE.
Aeronautical Research Council (Gt. Brit.)
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34665 HC$3.00 MF$0.65

EXPERIMENTS AT MACH NUMBER EQUALS 4.03 ON TWO FAMILIES OF PRESSURE-PLOTTING WING AND HALF CONE COMBINATIONS.
Aeronautical Research Council (Gt. Brit.)
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34692 HC$3.00 MF$0.65

TWO-DIMENSIONAL TURBULENT WALL JETS OVER CURVED SURFACES.
Mcgill Univ., Montreal (Quebec). Mechanical Engineering Research Lab.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34701 HC$3.00 MF$0.65

DOUBLE-DRIVER SHOCK TUBE FOR SHOCK-ON- SHOCK SIMULATION.
Aeronautical Research Inst. of Sweden, Stockholm.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34803 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF THE FREQUENCY AND VISCOUS DAMPING OF LIQUIDS DURING WEIGHTLESSNESS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
T. L. Labus, W. J. Masica, and J. A. Salzman. Aug 67, 20p NASA-TN-D-4132

Descriptors: *Liquid sloshing, *Natural frequency, *Viscous damping, *Weightlessness, Amplitude, Asymmetry, Bond, Characteristics, Circular, Cylinder, Damping, Dependence, Drop, Environment, Frequency, Interface, Liquid, Natural, Number, Right, Sloshing, Tower, Vapor, Viscous, Zero.

For abstract, see STAR 05 20.
N67-34899 HC$3.00 MF$0.65

A CRITICAL ANALYSIS OF VARIOUS NUMERICAL INTEGRATION METHODS FOR COMPUTING THE FLOW OF A GAS IN CHEMICAL NONEQUILIBRIUM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-35012 HC$3.00 MF$0.65

FORCE MEASUREMENTS ON AXISYMMETRIC MODELS WITH HAMMERHEAD NOSES AT TRANSONIC SPEEDS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-35113 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF HEAT TRANSFER AND PRESSURE DROP OF ARGON FLOWING THROUGH SINGLE TUBE WITH INTERNAL INTERRUPTED FINS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-35114 HC$3.00 MF$0.65

THE RADIATION SOUND FIELD OF A RECTANGULAR PANEL SET IN AN INFINITE WALL AND EXCITED BY A TURBULENT BOUNDARY LAYER.
Gt. Brit. Ministry of Aviation, London. Aeronautical Research Council.
For primary bibliographic entry see Field 20A.
For abstract, see STAR 05 20.
N67-35179 HC$3.00 MF$0.65

MACH NUMBER FUNCTIONS TABLES ACCORDING TO WHITHAM'S THEORY.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-35183 HC$3.00 MF$0.65

HEAT CONDUCTION IN HEMISPHERICAL SHELLS WITH APPLICATIONS TO AERODYNAMIC HEATING.
Weapons Research Establishment, Salisbury (Australia).
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-35211 HC$3.00 MF$0.65

VOID FRACTION MEASUREMENTS IN A TWO-PHASE FLOW NA K/ARGON.
European Atomic Energy Community, Ispra (Italy).
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 20.
N67-35279 HC$3.00 MF$0.65

TWO-PHASE VORTEX FLOW,
Michigan Univ., Ann Arbor. Lab. for Fluid Flow and Heat Transport Phenomena.
J. F. Lafferty, and F. G. Hammitt. May 67, 171p MMPP-293-2

Descriptors: (*Vortices, *Two-phase flow), Jets, Thrust, Air, Hydrodynamics, Water, Magnetohydrodynamic generators, Nuclear propulsion, Test facilities.

In view of the potential applications and importance of the gas-driven liquid vortex, the investigation was undertaken to determine the basic characteristics of this type of vortex flow.
PB-175 778 HC$3.00 MF$0.65

DETERMINATION OF LATERAL STABILITY CHARACTERISTICS FROM FREE-FLIGHT MODEL TESTS, WITH EXPERIMENTAL RESULTS ON THE EFFECTS OF WING VERTICAL POSITION AND DIHEDRAL AT TRANSONIC SPEEDS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 866 HC$3.00 MF$0.65

A STUDY OF THE ASYMMETRIC TRANSONIC FLOW PAST A SHARP LEADING EDGE.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 1A.
PB-175 867 HC$3.00 MF$0.65

JET-BOUNDARY CORRECTIONS FOR LIFTING ROTORS CENTERED IN RECTANGULAR WIND TUNNELS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 871 HC$3.00 MF$0.65

A METHOD FOR CALCULATION OF HYDRODYNAMIC LIFT FOR SUBMERGED AND PLANING RECTANGULAR LIFTING SURFACES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Kenneth L. Wadlin, and Kenneth W. Christopher. 1959, 16p NASA-TR-T-14

Descriptors: (*Planing surfaces, Fluid dynamic properties), (*Lift, Rectangular bodies), Numerical methods and procedures, Underwater objects, Hydrofoils, Aspect ratio, Dihedral angle.

A method is presented for the calculation of lift coefficients for rectangular lifting surfaces of aspect ratios from 0.125 to 10 operating at finite depths beneath the water surface, including the zero depth or planing condition. Theoretical values

are compared with experimental values obtained at various depths of submergence with lifting surfaces of aspect ratios from 0.125 to 10. The method can also be applied to hydrofoils with dihedral. Lift coefficients computed by this method are in good agreement with existing experimental data for aspect ratios from 0.125 to 10 and dihedral angles up to 30 degrees. (Author)
PB-175 878 HC$3.00 MF$0.65

THEORETICAL PRESSURE DISTRIBUTIONS ON WINGS OF FINITE SPAN AT ZERO INCIDENCE FOR MACH NUMBERS NEAR 1.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 1C.
PB-175 893 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERCAVITATING HYDROFOILS OPERATING NEAR THE FREE WATER SURFACE.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 13J.
PB-175 897 HC$3.00 MF$0.65

COLLECTION OF ZERO-LIFT DRAG DATA ON BODIES OF REVOLUTION FROM FREE-FLIGHT INVESTIGATIONS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 899 HC$3.00 MF$0.65

SIMILARITY OF NEAR NOISE FIELDS OF SUBSONIC JETS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20A.
PB-175 906 HC$3.00 MF$0.65

ON FULLY DEVELOPED CHANNEL FLOWS: SOME SOLUTIONS AND LIMITATIONS, AND EFFECTS OF COMPRESSIBILITY, VARIABLE PROPERTIES, AND BODY FORCES.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Stephen H. Maslen. 5 Jun 58, 25p NASA-TR-R-34L

Descriptors: (*Laminar flow, Fluid dynamic properties), Compressible flow, Gas flow, Fluid flow, Couette flow, Incompressible flow, Convection (Heat transfer).

Limitations on fully developed laminar flows due to compressibility and property variations are examined. The cases, for liquids and for gases, wherein such motions are 'exact' are determined and solutions are given. For more general conditions, not permitting an exact fully developed flow, limitations are set. Two cases arise depending on the size of the temperature variation across the channel. Both the forced and free flow are solved for the case of large temperature variation. Finally, there are described briefly some circumstances under which streamwise variations of velocity occur. The case where the velocity varies inversely with the square root of the distance is solved. (Author)
PB-175 907 HC$3.00 MF$0.65

NORMAL COMPONENT OF INDUCED VELOCITY FOR ENTIRE FIELD OF A UNIFORMLY LOADED LIFTING ROTOR WITH HIGHLY SWEPT WAKE AS DETERMINED BY ELECTROMAGNETIC ANALOG.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 1C.
PB-175 914 HC$3.00 MF$0.65

SIMILAR SOLUTIONS FOR THE COMPRESSIBLE BOUNDARY LAYER ON A YAWED CYLINDER WITH TRANSPIRATION COOLING.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 915 HC$3.00 MF$0.65

SHIELDING OF PARTIALLY REFLECTING STAGNATION SURFACES AGAINST RADIATION BY TRANSPIRATION OF AN ABSORBING GAS.
National Aeronautics and Space Administration, Moffett Field, Calif.
For primary bibliographic entry see Field 20M.
PB-175 918 HC$3.00 MF$0.65

A NOTE ON THE DETERMINATION OF AVAILABLE POTENTIAL ENERGY BY VARIATIONAL METHODS.
Florida State Univ., Tallahassee. Dept. of Meteorology.
For primary bibliographic entry see Field 4A.
PB-175 994 HC$3.00 MF$0.65

A STUDY OF THE BEHAVIOR OF SMALL SPHERES DURING REENTRY,
Aerotherm Corp., Palo Alto, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see NSA 21 18.
SC-CR-67-2635 HC$3.00 MF$0.65

HYDRODYNAMIC STABILITY OF THE LIQUID LAYER ON A SMALL OBJECT IN HIGH ALTITUDE REENTRY,
Stanford Univ., Calif. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 18N.
For abstract, see NSA 21 18.
SC-CR-67-2636 HC$3.00 MF$0.65

20E. Masers and Lasers

FLUORESCENT ION INTERACTION.
Final rept.,
Sperry Rand Research Center, Sudbury, Mass.
William W. Holloway, Jr. 1967, 65p SRRC-RR-64-39
Contract Nonr-4127 (00), ARPA Order-306-62

Descriptors: (*Rare earth elements, Fluorescence), (*Manganese, Fluorescence), (*Lasers, *Fluorescence), Ions, Interactions, Excitation, Quenching (Inhibition), Atomic energy levels, Tungstates, Magnetic properties.

Studies were made of the interaction of fluorescent ions in an effort to understand both the nature of the interaction mechanism and its implications for laser performance. Specifically, the interaction between rare-earth ions was studied, emphasizing both the energy exchange between rare-earth ions and the quenching of the fluorescence of one rare-earth ion by another. Certain features of Mn (2+) ion fluorescence which are present in concentrated but not dilute manganese systems, were also studied.
AD-440 481 HC$3.00

OPTICAL METHOD FOR ANALYSIS OF ATMOSPHERIC EFFECTS ON LASER BEAMS.
Memorandum rept.,
Ballistic Research Labs Aberdeen Proving Ground Md
Paul H. Deitz. Jul 67, 46p Rept no. BRL-MR-1840
Presented at the Symposium on Modern Optics, held at Waldorf-Astoria Hotel, New York City, 21-24 March, 1967.

Descriptors: (*Lasers, Atmospheric motion), (*Interference analyzers, Lasers), Propagation, Collimators, Intensity, Distribution, Measurement, Test methods.

The report describes the design of an instrumentation system for the study of the effects of atmospheric turbulence on a collimated laser beam under near-earth conditions. The instrumentation consists of a helium-neon laser with optical collimator and a receiving system of 24-inch aperture with narrow bandpass filter. The Appendix presents examples of beam cross section patterns for different propagation conditions. The method of analyzing spatial intensity distributions of these patterns is described. (Author)
AD-657 559 HC$3.00 MF$0.65

STATISTICAL PROPERTIES OF ELECTROMAGNETIC RADIATION.
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20N.
AD-657 586 HC$3.00 MF$0.65

LASER INDUCED SURFACE EFFECTS.
Final technical rept.,
Avco Missiles Space and Electronics Group Wilmington Mass. Avco Space Systems Div
R. Schlier, and J. Shumsky. 10 Jul 67, 45p Rept no. AVSSD-0244-67-RR
Contract DA-19-020-AMC-00521 (X)

Descriptors: (*Electron beams, *Lasers), Plasma physics, Energy, Graphite, Density, Electrons, Attenuation, Scattering, Detectors.

The document presents the results of experiments in which a moderate energy electron beam was used to probe the plasma created by a laser beam impinging on a graphite target. (Author)
AD-657 600 HC$3.00 MF$0.65

SPIN-WAVE INTERACTION WITH A LASER BEAM IN YIG,
California Univ Berkeley Electronics Research Lab
S. Wang, and G. Thomas. 10 Feb 67, 6p
AROD-4582:3
Grant DA-ARO (D)-31-124-G638
Availability: Published in Applied Physics Letters v10 n7 p210-12 Apr 1 1967.

Descriptors: (*Lasers, Neodymium), Stability, Absorption, Oscillation, Relaxation time, Radiofrequency power, Light, Oscilloscopes, Magnetic fields, Theory.

Experimental results are presented concerning the interaction of a Nd laser beam with spin waves in YIG in the subsidiary absorption region. The microwave power was held below the threshold for spin-wave instability. When hit by a laser beam, the sample showed characteristic magnetoelastic and relaxation oscillations. The same oscillations were observed without the laser beam if the microwave power was raised above the threshold for spin-wave instability. The result provides evidence of spin-wave excitation in YIG by a laser beam. (Author)
AD-657 718 Not available from CFSTI.

RESEARCH ON ADVANCED GASDYNAMICS TEST FACILITIES.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 14B.
AD-657 775 HC$3.00 MF$0.65

ANALYSIS AND EVALUATION OF SIMPLE ELECTROMAGNETIC MODELS FOR LASERS IN AXIAL MAGNETIC FIELDS AND PLANE DIFFRACTION GRATINGS.

Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Marion O. Hagler, and Arwin A. Dougal. 15 Aug 67, 146p Rept no. TR-35
AFOSR-67-1766
Grant AF-AFOSR-766-67

Descriptors: (*Lasers, *Magnetic fields), (*Diffraction gratings, Lasers), Electromagnetic properties, Anisotropy, Polarization, Integrals, Detectors, Helium, Neon, Rotation, Measurement, Frequency, Resonators, Theory.

By using a vector Kirchoff integral and introducing suitable approximations for the electromagnetic fields on the surface of a plane diffraction grating, the fraction of the diffracted radiation appearing in each diffraction order is calculated here. The results are given as an explicit closed form function of the shape of the grooves on the grating surface and the wavelength of the incident radiation. On the basis of the analysis, it is shown that for a grating with triangular grooves which are wide and shallow compared to a wavelength of the incident radiation, the maximum amount of radiation is directed into a given diffraction order when the groove shape is such that the radiation is specularly reflected from one face. Finally, comparison with experimental data confirms the accuracy of the calculations in parameter ranges for which the simple model of the grating is expected to be valid. A simple electromagnetic model of a laser immersed in an axial magnetic field permits the polarization state of the emitted radiation to be described as a function of the single pass Faraday rotation angle and the anisotropy coefficient of the Brewster windows. It is shown that as the single pass Faraday rotation angle of the lasing medium is increased toward some critical value determined by the resonator anisotropies, the laser output fields are linearly polarized and the frequency remains constant. The output polarization angle increases to a maximum value psi sub o determined by the resonator anisotropies. (Author)
AD-658 018 HC$3.00 MF$0.65

RESEARCH ON PLASMA DIAGNOSTIC METHODS FOR HIGH TEMPERATURE PLASMA RESEARCH.
Texas Univ Austin
For primary bibliographic entry see Field 20I.
AD-658 052 HC$3.00 MF$0.65

MULTI-MODE HIGH ENERGY LASER TRANSMITTER.
Interim rept.,
Control Data Corp Melville N Y Trg Div
A. L. Pogoda, and J. N. McGuire. Aug 67, 95p Rept no. TRG-086-1R-1
Contract AF 33 (615)-3888

Descriptors: (*Lasers, *Transmitter-receivers), Ruby, Energy, Q meters, Amplifiers, Design, Operation, Boresighting, Servomechanisms, Telescopes, Multiple operation.

The report outlines the progress made toward completion of the Multi-Mode High Energy Laser Transmitter System (MMHELTS) in the period from 6 September 1966 through 15 May 1967. In addition, it discusses design changes required for enhancement of the operation of the equipment in the field. Areas which TRG believe to be necessary additions and/or logical improvements to the operational capability of the overall system are discussed in detail. The overall configuration of the high energy system has not been changed from that in the design exhibit, submitted to Wright-Patterson Air Force Base on 1 September 1966. The ruby length of the Q-switched system, however, has been reduced to a total of 17 inches. The overall length has been divided into one Brewster's angled 4 in. Q-switched oscillator followed by 13 in. of active amplifier. The 13 in. amplifier section consists of a 4 in. cavity followed by a 9 in. cavity both of which are Brewster's angled. All ruby rods will remain 15mm in diameter. The status of the dynamic boresighting system development effort is also discussed herein. (Author)
AD-658 175 HC$3.00 MF$0.65

LASER RAMAN SCATTERING STUDIES OF CRYSTALS.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 20B.
AD-658 342 HC$3.00 MF$0.65

LASERS IN SPACE, ON THE EARTH, AND UNDER WATER,
Foreign Technology Div Wright-Patterson AFB Ohio
V. N. Chernyshev. 26 Apr 67, 92p Rept no. FTD-MT-65-373
TT-67-62867
Edited machine trans. of mono. Lazery v Kosmose; na Zemle i pod Vodoi, Moscow, 1964 p1-104.

Descriptors: (*Lasers, Optical equipment), Particle beams, Design, Quantum mechanics, Generators, Detection, Amplifiers, Energy, Gas lasers, Communication systems, Navigation, Underwater, Fiber optics, USSR.

The working principles are considered of quantum-mechanical generators and amplifiers of optical range-lasers. Laser devices of different types and assignments are discussed. Laser radiation (abroad they are sometimes called 'death rays') can be used not only as a weapon of destruction, but also as a means of super-range communication, detection, and navigation. The pamphlet generalizes extensive but separated material published in domestic and foreign periodic press. The work is designed for readers with secondary education, familiar with the bases of radio engineering. (Author)
AD-658 382 HC$3.00 MF$0.65

PHYSICS OF LASER OPERATION,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
D. G. Grant. 15 Mar 62, 27p Rept no. CF-2974
Contract NOrd-7386

Descriptors: (*Lasers, Operation), (*Crystals, Physics), Ruby, Light, Theory, Absorption, Optical properties, Rods, Oscillators, Protons, Atoms, Particle beams, Energy, Attenuation, Density, Special functions (Mathematical).

The object of this report is to provide those unfamiliar with crystal physics with an understandable explanation of the theory of laser operation. The report discusses the various physical theories necessary to understand basic laser operation. In order to demonstrate the effect of system parameters on laser operation, the report also contains an interpretation of several basic equations. The last section describes the output characteristics of an experimental ruby laser and interprets the effect of system parameters on them. (Author)
AD-658 386 HC$3.00 MF$0.65

AVAILABLE LASER WAVELENGTHS FOR VISIBLE AND NEAR-INFRARED SPECTROSCOPY.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
C. F. Dewey, Jr.. Mar 67, 16p IPP-2/60

Descriptors: *Infrared spectroscopy, *Semiconductor laser, *Spectrum, Broadening, Coherent, Energy, Frequency, Infrared, Injection, Laser, Near, Radiation, Semiconductor, Shift, Spectroscopy, Survey, Visible, Wavelength.

For abstract, see STAR 05 20.
N67-34688 HC$3.00 MF$0.65

INVESTIGATION OF THE POTENTIALITIES OF PHOTOCHEMICAL LASER SYSTEMS. PART 2- PRELIMINARY EXPERIMENTAL STUDIES FINAL REPORT, 1 FEB. 1966 - 31 JAN. 1967.
Hughes Research Labs., Malibu, Calif.
C. R. Giuliano, L. D. Hess, and J. D. Margerum.
31 Jan 67, 47p NASA-CR-85006
Contract NAS12-94

Descriptors: *Laser, *Photodissociation, *Solar radiation, Absorption, Coherent, Compound, Emission, Light, Monochromatic, Photochemistry, Pumping, Radiation, Solar, Spectroscopy, System, Ultraviolet, Visible.

For abstract, see STAR 05 20.
N67-35020 HC$3.00 MF$0.65

STIMULATED RAMAN EMISSION FROM RAMAN ACTIVE MATERIALS USING A GIANT-PULSE RUBY LASER,
Texas Univ., Austin. Antennas and Propagation Div.
H. Richard Arons, David L. Dobbins, and Alfred H. LaGrone. 15 Aug 67, 65p P-19
Grant NSF-GA-767

Descriptors: (*Lasers, Raman spectroscopy), Ruby, Particle beams, Scattering, Light, Intensity, Frequency, Benzene, Excitation, Tables.

Many new single-frequency light sources have been made possible by the discovery of stimulated Raman emission. In many cases the requirements of an intense single-frequency light source of specified frequency can now be met. This paper presents the experimental arrangements and equipment used to observe stimulated Raman emission. The first and second Stokes emission lines in benzene were observed in the emission at 90 degrees to the laser beam. The first and second Stokes emission lines in toluene were observed in the emission at 90 degrees to the laser beam. The first, second, and third Stokes emission lines in benzene were observed in axial emission. (Author)
PB-175 809 HC$3.00 MF$0.65

20F. Optics

FEEDBACK-STABILIZED LIGHT CHOPPER WITH CONTINUOUSLY VARIABLE FREQUENCY.
Revised ed.,
Johns Hopkins Univ Baltimore Md Dept of Physics
C. Opal, and W. B. Gandrud. 20 Feb 67, 5p
AROD-5400:5
Contract DA-31-124-ARO (D)-339
Revision of manuscript submitted 14 Dec 66.
Availability: Published in The Review of Scientific Instruments v38 n6 p838-40 Jun 1967.

Descriptors: (*Light, Control systems), Laboratory equipment, Feedback, Stabilization systems, Servomechanisms, Velocity.

The construction of a chopper driven by a universal motor whose speed is stabilized by a frequency-sensitive feedback control system, with the frequency continuously adjustable from 8 to 3000 Hz is reported. (Author)
AD-657 536 Not available from CFSTI.

STATISTICAL PROPERTIES OF ELECTROMAGNETIC RADIATION.
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20N.
AD-657 586 HC$3.00 MF$0.65

SPECTRAL TRANSMISSION OF TWO OPTICAL SYSTEMS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
A. E. Smith. Jan 67, 22p Rept no. RAE-TR-67010

Descriptors: (*Optical instruments, Design), (*Optical tracking, Measurement), Star trackers, Telescopes, Monochromatic light, Theory, Calibration, Sensitivity, Photomultipliers, Accuracy, Reflection.

In the calibrations of a star tracking system it is essential that the spectral transmission of the associated telescope is known. The report describes measurements made on two optical designs, one in use in an experimental star tracking system and one envisaged as a possible design for future systems. (Author)
AD-657 593 HC$3.00 MF$0.65

DISCRIMINATION OF SMALL TIME INTERVALS BETWEEN A VISUAL AND AN AUDITORY SIGNAL.
Johns Hopkins Univ Baltimore Md Psychological Lab
For primary bibliographic entry see Field 5J.
AD-657 623 HC$3.00 MF$0.65

UNIFORM ASYMPTOTIC EXPANSION OF THE FIELD SCATTERED BY A CONVEX OBJECT AT HIGH FREQUENCIES,
New York Univ N Y Courant Inst of Mathematical Sciences
Donald Ludwig. Apr 66, 40p Rept no. Scientific-217
AFCRL-67-0422
Contract AF 19 (628)-3868
Availability: Published in Communications on Pure and Applied Mathematics v20 n1 p103-38 Feb 1967.

Descriptors: (*Diffraction, *Boundary value problems), (*Scattering, Cylindrical bodies), Light, Illumination, Reflection, Optics, Mathematical analysis.
Identifiers: Wave equation.

The problem of scattering is concerned with the determination of a function us (x,k), which is a solution of the reduced wave equation in the exterior of a closed surface S in three dimensions. An incident field ui (x,k) is prescribed, and ui + us is required to vanish for x on S. The function us is also required to satisfy a radiation condition. In the case where S has Gauss curvature bounded away from zero (or a convex cylinder) and S is analytic, for each positive integer n we give a series in descending powers of k which satisfies the conditions of the problem in an asymptotic sense, i.e., ui (n) + us (n) satisfies the differential equation and boundary condition to arbitrarily high order in 1/k if n is chosen large enough. In the region of deep shadow on S ui (n) + us (n) is bounded by exp (-k to the 1/3 power A)/k to the power 2 (n-1)/3, where A is positive and proportional to the distance to the shadow boundary measured along S. (Author)
AD-657 666 Not available from CFSTI.

ACCURACY AND SENSITIVITY OF THE THERMAL LENS METHOD FOR MEASURING ABSORPTION,
California Univ Berkeley Dept of Electrical Engineering
Domenico Solimini. 18 May 66, 10p
AFOSR-67-2064
Grant AF-AFOSR-139-65
Availability: Published in Applied Optics v5 n2 p1931-9 Dec 1966.

Descriptors: (*Absorption, *Optics), (*Lenses, Thermal properties), Mirrors, Resonators, Lasers, Intensity, Refraction, Sensitivity, Measurement.

The effect of two lenses inserted in an optical resonator is studied. The modified resonance condition is given together with the stability condition and the spot sizes at the mirrors. Diagrams are given which allow the focal lengths of two lenses to be calculated from the known spot sizes at both mirrors. The effect of a third (the thermal) lens is studied and conditions for calculating its focal length by measuring the spot size at one mirror only are examined. The experimental procedure for the measurement of absorbencies by the thermal lens method is outlined. The various effects that can affect the precision of the measurement are studied, and the conditions for maximum sensitivity of the method are given. (Author)
AD-657 904 Not available from CFSTI.

LINE BROADENING OF LIGHT SCATTERED FROM A LIQUID SURFACE,
Massachusetts Inst of Tech Cambridge Dept of Physics
Robert H. Katyl, and Uno Ingard. 29 May 67, 3p
Contract Nonr-1841 (42)
Availability: Published in Physical Review Letters v19 n2 p64-6 Jul 10 1967.

Descriptors: (*Coherent radiation, Scattering), (*Line spectrum, Surfaces), Methanols, Propanols, Excitation, Oscillation, Acoustics.

Results are reported of a spectral analysis of light scattered by a liquid surface. These results are consistent with the assumption that thermally excited surface waves are responsible for the scattering, and the phenomenon may be regarded as the surface-wave analog of ordinary Brillouin scattering in the bulk of a fluid.
AD-657 922 Not available from CFSTI.

EVALUATION OF LENSES FOR USE IN ALL-SKY PHOTOMETERS,
Los Alamos Scientific Lab N Mex
For primary bibliographic entry see Field 17H.
AD-657 955 HC$3.00 MF$0.65

SOVIET AND POLISH RESEARCH ON THE SELF-TRAPPING OF OPTICAL BEAMS IN NON-LINEAR MEDIA.
Atd Work assignment no. 71,
Library of Congress Washington D C Aerospace Technology Div
Yuri Ksander. 23 Sep 67, 24p Rept no. ATD-67-28
TT-67-62822
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Optics, Reports), Fiber optics, Attenuation, Reflection, Waveguides, Intensity, Lasers, Kerr cells, Absorption, Excitation, Liquids, Mirrors, Optical instruments, Lenses.

The purpose of the report is to present an up-to-date progress review of the Soviet and Polish research on optical beam trapping. The now classic paper on the self-trapping of optical beams in nonlinear media by Chiao, Garmire, and Townes published in the Physical Review Letters in October 1964, was preceded in the Soviet literature by the works of G. A. Askar'yan of the Lebedev Institute and V. I. Talanov of the Scientific-Research Radiophysics Institute at Gor'kiy State University, which were published in June 1962 and 1964, respectively. Since that time Soviet researchers have contributed some 15 papers on various aspects of the self-focusing of optical beams. Significant research on the self-trapping of optical beams is being carried out in Poland. It appears to be managed by A. Piekara, Poland's foremost laser authority, with the A. Mickiewicz University at Poznan as the principal facility.
AD-658 016 HC$3.00 MF$0.65

BRILLOUIN SCATTERING EXPERIMENTS IN THE FERROELECTRIC CRYSTAL TRIGLYCINE SULFATE.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 20L.
AD-658 167 HC$3.00 MF$0.65

ELLIPSOMETRY USING A RETARDATION PLATE AS COMPENSATOR,
California Univ Berkeley Dept of Electrical Engineering
W. G. Oldham. 3 Oct 66, 10p
AFOSR-67-2087
Grant AF-AFOSR-139-66
Availability: Published in Journal of the Optical Society of America v57 n5 p617-24 May 1967.

Descriptors: (*Optical analysis, Equations), Solids, Surfaces, Films, Polarization, Light transmission, Instrumentation, Alignment, Optical equipment components.
Identifiers: Ellipsometry.

The equations of ellipsometry are derived relating the specimen properties, rho = tau psi ((e)exp. i delta), to the instrument settings P, A, and Q. The treatment differs from previous works in that both of the important parameters of the retardation plate are considered, namely, the retardation delta and the transmission ratio T, of the slow to the fast axis. Equations are developed which determine delta and T from the instrument readings. Conventional averaging procedures to obtain psi from readings of A are shown to be valid; however, it is demonstrated that the usual procedures for obtaining delta from readings of P are invalid and a correction is derived. Furthermore, an unsuspected source of error, namely, orientation of the retardation plate oblique to the light beam, is shown to produce large errors in some measurements. (Author)
AD-658 247 Not available from CFSTI.

RESEARCH DIRECTED TOWARD DETERMINATION OF RADIATIVE PROPERTIES AND COMPOSITION OF THE ATMOSPHERE.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 4A.
AD-658 292 Not available from CFSTI.

CORRELATION FUNCTION SPATIAL FILTERING WITH INCOHERENT LIGHT,
Michigan Univ Ann Arbor Inst of Science and Technology
Philip L. Jackson. 8 Mar 67, 3p
AFOSR-67-2152
Contract AF 49 (638)-1759
Availability: Published in Journal of Applied Optics v6 n7 p1272 Jul 1967.

Descriptors: (*Optics, Statistical functions), Optical filters, Light, Illumination, Focusing, Optical images.

The method of lensless correlography (Meyer-Eppler effect) has been extended to image one of the transparencies which are being correlated. An optical filter is placed in the correlation plane, so that the image of the transparency represents the 'time-domain' analog of a complex frequency filter. (Author)
AD-658 356 Not available from CFSTI.

ASTIGMATISM IN THE MACH-ZEHNDER INTERFEROMETER,
Defence Standards Labs Maribyrnong (Australia)
D. B. Prowse. 10 Jan 67, 1p
Availability: Published in Applied Optics v6 n4 p773 Apr 1967.

Descriptors: (*Interferometers, Distortion), Flow visualization, Optical instruments, Optical images, Refraction.
Identifiers: Astigmatism.

The astigmatic effect appearing in the interferogram of objects placed in one of the beams of Mach-Zehnder interferometer is pointed out. This effect is due to refraction at one of the beam splitters.
AD-658 404 Not available from CFSTI.

REVISION OF THE NBS TABLES OF SPECTRAL-LINE INTENSITIES BELOW 2450A,
National Bureau of Standards, Washington, D. C.
Charles H. Corliss. 7 Jul 67, 37p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20403 price $0.30.

Descriptors: (*Line spectrum, Intensity), (*Ultraviolet spectroscopy, Tables), Atomic spectroscopy, Calibration, Electron transitions, Atomic energy levels.

A calibration is applied to the intensity measurements of the 1400 lines below 2450 A in the NBS Tables of Spectral-Line Intensities. Tables of the new values are presented with the lines arranged by elements and by wavelengths. (Author)
NBS-Mono-32-Suppl HC$0.30 MF$0.65

AVAILABLE LASER WAVELENGTHS FOR VISIBLE AND NEAR-INFRARED SPECTROSCOPY.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
For primary bibliographic entry see Field 20E.
For abstract, see STAR 05 20.
N67-34688 HC$3.00 MF$0.65

SELF-STEEPENING OF LIGHT PULSES.
Lincoln Lab., Mass. Inst. of Tech., Lexington.
F. De Martini, T. K. Gustafson, P. L. Kelley, and C. H. Townes. 1967, 57p NASA-CR-87476
Grant NSG-330, Contract DA-28-043-AMC-02536/E/

Descriptors: *Light transmission, *Optical signal, *Refractive index, Dependence, Index, Intensity, Light, Optical, Propagation, Pulse, Refraction, Relaxation, Shock, Signal, Steepness, Transmission.

For abstract, see STAR 05 20.
N67-34750 HC$3.00 MF$0.65

20G. Particle Accelerators

TARGETS OF EFFICIENT NEUTRON GENERATORS,
Naval Scientific and Technical Information Centre London (England)
Z. Hulek. May 67, 17p Rept no. NSTIC/12312/67, NSTIC-Trans-1808
TT-65-18119
Trans. of Ceskoslovensky Casopis pro Fysiku, v14 p467-79 1964.

Descriptors: (*Neutron beams, Sources), Particle accelerator targets, Cooling, Heat transfer, Numerical analysis, Deuteron beams, Great Britain, Czechoslovakia.
Identifiers: Neutron sources.

The paper gives the characteristics of some types of high yield neutron generators. It deals in detail with cooling of the target, which is the basic problem of increasing the yield of neutrons. It describes the technique of the heat transfer calculation of a target in conditions of continuous and pulsed operation. A rotating target enables the yield to be increased. (Author)
AD-658 346 HC$3.00 MF$0.65

PHERMEX A PULSED HIGH-ENERGY RADIOGRAPHIC MACHINE EMITTING X-RAYS,
Los Alamos Scientific Lab., N. Mex.
Douglas Venable, D. O. Dickman, J. N. Hardwick, and T. J. Boyd. 15 May 67, 252p
Contract W-7405-eng-36

Descriptors: (*Electron accelerators, *Gamma rays), (*X rays, Penetration), (*Electron beams, Flash radiography), Explosive materials, Bremsstrahlung, Integration.

For abstract, see NSA 21 17.
LA-3241 HC$3.00 MF$0.65

CALIBRATION OF TANDEM ANALYZING MAGNET,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 18.
LA-3699 HC$3.00 MF$0.65

QUARTERLY STATUS REPORT ON THE MEDIUM-ENERGY PHYSICS PROGRAM FOR THE PERIOD ENDING APRIL 30, 1967.
Los Alamos Scientific Lab., N. Mex.
May 67, 47p
Contract W-7405-eng-36

Descriptors: (*Electron accelerators, *Power amplifiers), (*Analog computers, *Temperature control), Power supplies, Protons, Velocity, Performance (Engineering).

For abstract, see NSA 21 17.
LA-3712 HC$3.00 MF$0.65

ANNUAL REPORT, JANUARY 1-DECEMBER 31, 1966.
Princeton Univ., N. J. Plasma Physics Lab.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 18.
MATT-Q-24 HC$3.00 MF$0.65

RESEARCH FOR AND SYNTHESIS OF A THERMOSTABLE MATERIAL OF HIGH ISOTOPIC HYDROGEN CONTENT, AND FABRICATION OF A NEW TARGET FOR NEUTRON PRODUCTION IN ACCELERATORS.
Recherche Et Synthese D'un Materiau Thermostable A Haute Teneur en Hydrogene Isotopique Et Fabrication D'une Nouvelle Cible pour La Production de Neutrons Dans les Accelerateurs
Liege Univ. (Belgium). Institut de Chimie Et Physique Nucl'eaires.
M. A. Guillaume, and J. M. Peeters. May 67, 76p
EUR-3474.F
Contract EURATOM-050-63-8 RISB
in French, English Summary

Descriptors: *Hydrogen, *Particle accelerator, *Target, *Thermostability, Accelerator, Benzene, Fabrication, Isotope, Neutron flux, Particle, Particle production, Polymer, Polyphenyl.

For abstract, see STAR 05 20.
N67-34364 HC$3.00 MF$0.65

AN EXPERIMENTAL ANALYSIS OF 90 DEG UNIFORM FIELD BEAM BENDING MAGNETS FOR USE WITH ELECTROSTATIC GENERATORS.
Gt. Brit. National Inst. for Research in Nuclear Science, Chilton. Electrostatic Generator Group.
W. R. Morris. Sep 66, 40p RHEL/R-119

Descriptors: *Electromagnet, *Electrostatic generator, *Magnetic field, *Particle beam, Alpha, Beam, Bending, Electrostatic, Field, Focusing, Generator, Magnetic, Particle, Ray, Theory, Tracing, Uniform.

For abstract, see STAR 05 20.
N67-34385 HC$3.00 MF$0.65

PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3B.
For abstract, see NSA 21 17.
ORNL-4082 HC$3.00 MF$0.65

ELECTRONUCLEAR DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966.
Oak Ridge National Lab., Tenn.
May 67, 136p
Contract W-7405-eng-26

Descriptors: (*Protons, *Bremsstrahlung), (*Nuclei, Interactions), Nucleons, Elastic scattering, Cyclotrons, Nuclear reactions, Particle accelerators, Inelastic scattering.

For abstract, see NSA 21 18.
ORNL-4122 HC$3.00 MF$0.65

TWO-MILE ACCELERATOR PROJECT.
Quarterly status rept. 1 Oct-31 Dec 66.
Stanford Linear Accelerator Center, Calif.
May 67, 81p
Contract AT (04-3)-400

Descriptors: (*Linear accelerators, *Electron beams), (*Positrons, *Particle accelerators), (*Particle beams, Intensity), Construction, Installation.

For abstract, see NSA 21 17.
SLAC-73 HC$3.00 MF$0.65

20H. Particle Physics

EXPERIMENTAL GAMMA RAY BACKSCATTERING BY VARIOUS MATERIALS,
Technical Operations, Inc., Burlington, Mass.
For primary bibliographic entry see Field 18F.
AD-447 675 HC$3.00

ALGEBRA OF CURRENTS AND THE VECTOR-MESON-BARYON COUPLING CONSTANTS IN BROKEN SU (3),
Indiana Univ Bloomington Dept of Physics
For primary bibliographic entry see Field 20J.
AD-657 545 Not available from CFSTI.

STATISTICAL PROPERTIES OF ELECTROMAGNETIC RADIATION.
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20N.
AD-657 586 HC$3.00 MF$0.65

LASER INDUCED SURFACE EFFECTS.
Avco Missiles Space and Electronics Group Wilmington Mass. Avco Space Systems Div
For primary bibliographic entry see Field 20E.
AD-657 600 HC$3.00 MF$0.65

RADIATIVE CAPTURE OF 3He BY 3He,
California Inst of Tech Pasadena
W. D. Harrison, W. E. Stephens, T. A. Tombrello, and H. Winkler. Jun 67, 19p
Contract Nonr-220 (47)

Descriptors: (*Helium, *Nuclear reactions), Beryllium, Gamma emission, Nuclear energy levels, Nuclear cross sections, Stars.

The reaction 3He + 3He to 6Be* + gamma was observed at 90 deg. for bombarding energies between 0.86 and 11.8 MeV. The total cross section for transitions to the first excited state of 6Be varies smoothly from 0.4 to 9.3 microbarns (assuming isotropy). No gamma-ray transitions to the ground state of 6Be were observed with an upper limit of approximately 0.01 microbarns at 1.4 MeV. Because of these low cross sections, this reaction is of negligible astrophysical importance compared to the 3He (3He,2p)4He reaction. (Author)
AD-657 619 HC$3.00 MF$0.65

ENERGY DEPENDENCE OF p-O16 ELASTIC SCATTERING BETWEEN 20 AND 50 MeV AND THE OPTICAL MODEL.
Technical rept.,
California Univ Los Angeles Dept of Physics
John M. Cameron. Jul 67, 140p Rept no. P-80
Contracts N00014-67-A-0009, AT (11-1)-GEN-10

Descriptors: (*Oxygen, *Nuclear models), (*Proton scattering, Differential cross section), Elastic scattering, Nuclear resonance, Nuclear cross sections, Proton beams, Polarization.
Identifiers: Optical nuclear models.

Differential cross sections for the elastic scattering of protons by oxygen were measured at incident proton energies of 23.4, 24.5, 27.3, 30.1, 34.1, 36.8, 39.7, 43.1 and 46.1 MeV. The data cover the center of mass scattering angles from 10 to 160 degrees and have a relative uncertainty smaller than 2%. The results show strong resonances to exist below 30 MeV which appreciably distort the monotonic energy variation found at the higher energies. The results were compared with those obtained by other investigators in this energy region. Total reaction cross sections for proton incident on oxygen were measured at energies of 27.2, 34.2, 40.6 and 45.2 MeV using a beam attenuation technique. The results show a slow decrease with increasing energy. A preliminary optical model analysis of the differential cross section data, together with polarization data at the same energies, was made in the energy range 30 - 40 MeV using an eleven parameter optical model search code. This analysis demonstrated that the model is able to fit the data to large scattering angles with its parameters still retaining a smooth energy dependence. The predictions for the total cross sections were in good agreement with the measurements. (Author)
AD-657 631 HC$3.00 MF$0.65

STATISTICAL-EQUILIBRIUM MODEL ATMOSPHERES FOR EARLY-TYPE STARS. I. HYDROGEN CONTINUA,
Princeton Univ N J Observatory
For primary bibliographic entry see Field 3B.
AD-657 655 Not available from CFSTI.

PARTIAL SYMMETRY,
Harvard Univ Cambridge Mass
For primary bibliographic entry see Field 20J.
AD-657 656 Not available from CFSTI.

ELECTRON EXCITATION FUNCTIONS OF MERCURY,
Oklahoma Univ Norman Dept of Physics
Richard J. Anderson, Edward T. P. Lee, and Chun C. Lin. 10 Oct 66, 12p
AFOSR-67-1958
Contract AF 29 (601)6020, Grant AF-AFOSR-252-65
Availability: Published in The Physical Review v157 n1 p31-40 May 5 1967.

Descriptors: (*Electrons, *Excitation), (*Mercury, Atoms), Particles, Theory, Detectors, Energy, Monochromators, Pressure, Particle beams, Tables, Measurement.

Absolute excitation functions of some 40 transitions of the mercury atom have been measured. As in the case of helium, the excitation functions of the singlet states have the common feature of a broad maximum around 30 eV, whereas the triplet states show the characteristic sharp peaks at lower voltages. The excitation functions of the lower states exhibit fine structure near the threshold, which may be attributed to cascade from the states of higher energies. The cascading effect has been examined for the excitation of the 7 1So, 7 3P2, 6 3D2 states. At 15 eV the cascade corrections are small for 7 3P2, 6 3D3, and 6 3D2, but amount to approximately 42% for 7 1So. The major source of population of the 7 3S1 state is found to be cascade transitions from the 7 3P2 state rather than direct excitation. Direct-excitation cross sections of the 7 1So, 6 3D3, and 7 3P2 states at 15 eV have been determined and the results are compared with the theoretical calculations. (Author)
AD-657 665 Not available from CFSTI.

VELOCITY DEPENDENCE OF TOTAL CROSS SECTION FOR THERMAL ENERGY ATOM-MOLECULE SCATTERING,
General Dynamics/Convair San Diego Calif Space Science Lab
R. K. B. Helbing, and E. W. Rothe. 1967, 5p
AROD-6060:5
Availability: Published in International Conference on the Physics of Electronic and Atomic Collisions (5th), p642-3 1967.

Descriptors: (*Thermal properties, Molecules), (*Atoms, Scattering), Anisotropy, Velocity, Molecular properties, Rotation, Measurement, Particle beams, Atomic properties.

The velocity dependence of total cross section is measured for a number of different types of molecules colliding with alkali atoms. (Author)
AD-657 702 Not available from CFSTI.

FURTHER CONSEQUENCES OF THE QUARK MODEL IN INELASTIC MESON-BARYON SCATTERING,
Stanford Univ Calif
For primary bibliographic entry see Field 20J.
AD-657 715 Not available from CFSTI.

STRONG INITIAL- AND FINAL-STATE INTERACTIONS IN NONMESONIC HYPERNUCLEAR DECAYS AND IN PARITY-VIOLATING N + N TO N + N REACTIONS,
Stanford Univ Calif Dept of Physics
J. Barclay Adams. 14 Oct 66, 14p
AFOSR-67-2029
Contract AF 19 (628)-1389
Availability: Published in The Physical Review v156 n5 p1611-22 Apr 25 1967.

Descriptors: (*Decay schemes, Interactions), (*Hyperons, Interactions), (*Nucleons, Interactions), Wave functions, Nuclear cross sections, Approximation (Mathematics), Groups (Mathematics), Nuclear scattering, V particles.
Identifiers: Born approximation, Symmetry (Quantum mechanics).

A distorted wave Born calculation is used to show that the strong initial- and final-state interactions in nonmesonic hypernuclear decays, lambda hyperon + N to N+N, are of major importance, greatly suppressing certain transitions, and suggest the dominance of one-pion exchange in the explanation of hypernuclear decay rates. Weak exchange of heavier mesons is also suppressed by the strong interactions both in lambda hyperon + N to N+N - badly breaking any SU (3) symmetry of the reactions - and in the parity-violating N+N to N+N. It is shown that the decay rate of heavy hypernuclei provides a measure of the lambda hyperon - N correlation function at short distances in nuclear matter and should depend significantly on the existence of a hard core in the lambda hyperon -N strong interaction. (Author)
AD-657 716 Not available from CFSTI.

C12 (p,2p)B11 REACTION AT 50 MeV,
Oregon Univ Eugene
H. G. Pugh, D. L. Hendrie, Marc Chabre, and E. Boschitz. 25 Aug 66, 10p
AFOSR-67-1979
Grants AF-AFOSR-947-67, AF-AFOSR-974-65
Research supported in part by AEC. Prepared in cooperation with California Univ., Berkeley. Lawrence Radiation Lab.
Availability: Published in Physical Review v155 n4 p1054-61 Mar 20 1967.

Descriptors: (*Carbon, Proton bombardment), (*Proton reactions, *Nuclear shell models), Boron, Nuclear energy levels, Nuclear spectroscopy, Excitation, Proton scattering.

The C12 (p,2p)B11 reaction was studied at a bombarding energy of 50.0 plus or minus 0.2 MeV with an energy resolution of 300 keV. Transitions were observed to the ground state and to the 2.14-, 4.46-, 5.04-, and 6.76-MeV excited states of B11. Angular correlation measurements were made in various coplanar geometrical arrangements. In the symmetric geometry, where the protons are detected at equal angles on either side of the incident beam direction, the angular correlation was measured from 15 to 115 deg. In an asymmetric geometry in which one detector was fixed at 30 deg., measurements were made as the other detector was moved between 15 and 100 deg. on the other side of the beam direction. Both of the angular correlations are characterized by a general rise in the forward direction, modulated by a diffractionlike structure, when only those events are selected in which the energies of the selection protons are equal. The results of a distorted-wave analysis are presented and discussed. The formation of the 4.46-MeV (5/2-) and 6.67-MeV (7/2-) states is discussed in terms of the ejection of a proton from the lf shell in C12 and, more attractively, in terms of a two-stage process involving both the ejection of a lp-state proton and a core excitation. (Author)
AD-657 744 Not available from CFSTI.

COUPLING BETWEEN NUCLEAR AND ELECTRONIC MOTION IN DIATOMIC MOLECULES,
Yale Univ New Haven Conn
Hans Laue. 17 Nov 66, 8p
AFOSR-67-1975
Grant AF-AFOSR-843-65
Availability: Published in The Journal of Chemical Physics v46 n8 p3034-40 Apr 15 1967.

Descriptors: (*Diatomic molecules, Quantum mechanics), Motion, Rotation, Nuclear properties, Electrons, Atoms, Nuclei, Approximation (Mathematics).

The paper presents a general theory of the coupling between nuclear and electronic motion in diatomic molecules. Special consideration is given to the case of large nuclear separation. It is shown that, for large separation of the nuclei, the electron-nuclear coupling terms are of the order of the isotope effect. The physical meaning of an (R-2)-dependent potential, which was found by Dalgarno and McCarroll, is explained as a centrifugal effect associated with a certain rotation of the electrons within the atoms. It is not significant at large separations. (Author)
AD-657 756 Not available from CFSTI.

FINITE TEMPERATURE THEORY FOR THE ATTENUATION OF QUASI-PARTICLE EXCITATIONS IN REAL METALS.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab

Richard W. Davies. 14 Aug 67, 27p Rept no. TN-1967-39
ESD-TR-67-336
Contract AF 19(628)-5167

Descriptors: (*Excitation, Theory), Temperature, Attenuation, Metals, Electrons, Energy, Interactions, Numerical analysis, Approximation (Mathematics).

The finite temperature generalization of the Quinn, Adler theory for the decay rate of electronic excitations in a normal Fermion system is presented. The theory is developed in terms of quasi-particle parameters and without restriction to a particular approximation, such as RPA, for the dielectric response of the system. The relations derived are pertinent to the lifetime problem in real solids; in particular, local field effects are rigorously taken into account. (Author)
AD-657 776 HC$3.00 MF$0.65

INTERMOLECULAR POTENTIAL ENERGIES BY A MOLECULAR BEAM SCATTERING METHOD.
General Dynamics/Convair San Diego Calif Space Science Lab
For primary bibliographic entry see Field 7D.
AD-657 784 HC$3.00 MF$0.65

SUBTRACTIONS IN DISPERSION RELATIONS,
University Coll London (England)
For primary bibliographic entry see Field 20J.
AD-657 814 Not available from CFSTI.

MAGNETIC MOMENTS AND PION CURRENTS IN NUCLEAR MATTER,
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 20J.
AD-657 885 Not available from CFSTI.

SCATTERING OF MOLECULAR BEAMS OF He, D2 AND H2 FROM THE (111) PLANE OF Ag,
General Dynamics San Diego Calif General Atomic Div
For primary bibliographic entry see Field 7D.
AD-657 895 Not available from CFSTI.

ON THE ELECTROMAGNETIC STRUCTURE OF THE YUKAWA MESON. II,
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 20J.
AD-657 905 Not available from CFSTI.

ENERGY LOSS AND STRAGGLING OF HIGH ENERGY MUONS IN NaI (Tl),
Stanford Univ Calif High Energy Physics Lab
E. H. Bellamy, R. Hofstadter, W. Lakin, J. Cox, and M. Perl. Jul 67, 14p Rept no. HEPL-511
Contract Nonr-225 (67)
Prepared in cooperation with Stanford Linear Accelerator Center, Calif., SLAC-Pub-324.
Availability: Published in The Physical Review.

Descriptors: (*Muons, Energy), (*Scintillation counters, Meson bombardment), Sodium compounds, Iodides, Thallium, Transport properties, Momentum, Ionization.

Absolute values of the most probable energy loss and the energy loss straggling for high energy muons passing through NaI (Tl) were measured over the muon momentum range from 0.5 GeV/c to 10.5 GeV/c. The results agree, within the 1% experimental uncertainty, with the theoretical values. (Author)
AD-657 930 Not available from CFSTI.

DYNAMICAL THEORY OF BARYONS AND LEPTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
For primary bibliographic entry see Field 20J.
AD-657 959 HC$3.00 MF$0.65

CROSSING MATRICES FOR PARTICLES OF ARBITRARY ISOSPIN,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20J.
AD-657 960 Not available from CFSTI.

OVERLAPPING CHANNELS AND MULTI-CHANNEL PHENOMENA,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20J.
AD-657 961 Not available from CFSTI.

THE BINDING ENERGY OF THE TRITON WITH A VELOCITY-DEPENDENT POTENTIAL.
Doctoral thesis,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
B. K. Srivastava. 11 Sep 64, 14p
Contract Nonr-401 (51)
Availability: Published in Nuclear Physics v67 p236-48 1965.

Descriptors: (*Tritons, *Nuclear binding energy), Potential scattering, Nuclear energy levels, Wave functions, Perturbation theory, Helium.

A variational calculation was made of the binding energy of the triton using a two-body velocity-dependent central potential adjusted to fit two-body low and high energy scattering data and the binding energy of the deuteron. Use was made of a set of one, two and three parameter trial functions. The values of the binding energy of the triton obtained with these trial functions suggest that convergence was nearly obtained. Obviously, the highest value for the binding energy is obtained with the three-parameter trial function and is equal to 7.17 MeV. Also calculated was the Coulomb energy of He3 by the usual perturbation method and a value was obtained equal to 0.663 MeV. These values of the binding energy of the triton and the Coulomb energy of He3 agree reasonably well with similar calculations using repulsive hard core potentials but are lower than the experimental values. (Author)
AD-657 962 Not available from CFSTI.

RELATIVISTIC TREATMENT OF SPIN INDEPENDENCE,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20J.
AD-657 963 Not available from CFSTI.

THRESHOLD FACTORS IN PARTIAL-WAVE DISPERSION RELATIONS.
Revised ed.,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
L. M. Simmons, Jr. 7 Jan 66, 6p
Contract Nonr-401 (51)
Revision of manuscript submitted 13 Sep 65. Prepared in cooperation with Minnesota Univ., Minneapolis, School of Physics.
Availability: Published in The Physical Review v144 n4 p1157-62 Apr 29 1966.

Descriptors: (*Meson scattering, *Dispersion relations), (*Pions, Dispersion relations), (*Nucleons, Dispersion relations), Field theory, Wave functions, Moments, Phase shift.

If the solution of an approximate partial-wave dispersion relation is required to satisfy unitarity and possess the correct threshold behavior, additional poles (representing effective forces) are introduced into the amplitude. These poles are explicitly exhibited. To enforce l-wave threshold conditions, approximately l arbitrary parameters appear (the precise number depending upon the properties of the amplitude considered). This difficulty is in principle independent of the method of solution. Using the nucleon exchange force as input, the J = 3/2 amplitudes for pion-N scattering are obtained by numerical solution of the N/D equations. The solutions are extremely sensitive to the arbitrary parameters. It appears that, in the present formulation, partial-wave dispersion relations do not provide a reliable means of calculating detailed properties of the amplitudes. (Authhor)
AD-657 965 Not available from CFSTI.

VIRTUAL PION-NUCLEON SCATTERING,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
F. Selleri. 14 Jun 65, 14p
Contract Nonr-401 (51)
Availability: Published in Il Nuovo Cimento v40A n1 p236-49 Nov 1 1965.

Descriptors: (*Meson scattering, *Dispersion relations), (*Pions, Nuclear scattering), (*Nucleons, Meson scattering), Wave functions, Momentum, Nuclear resonance, Integral equations, Nuclear shell models, Proton scattering.

A discussion is given of the problem of pion-nucleon scattering when the initial pion is virtual with the aid of one-dimensional dispersion relations, under the usual assumption that the dispersive integrals are dominated by the I = J = 3/2 partial-wave amplitude. The problem of obtaining the off-shell behaviour of the latter amplitude is reconsidered by avoiding certain approximations which had been used previously. The improvements are important at high momentum transfer. Furthermore the other partial-wave amplitudes are calculated and, in particular, a large S1/2 amplitude with I = 1/2 is obtained. The significance of this result in certain production processes is discussed. (Author)
AD-657 966 Not available from CFSTI.

VIRTUAL NUCLEON EFFECTS,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
F. Selleri. 9 Apr 65, 18p
Contract Nonr-401 (51)
Availability: Published in Il Nuovo Cimento v34 n4 p1122-39 Oct 16 1965.

Descriptors: (*Nucleons, Meson scattering), (*Pions, Nuclear scattering), (*Meson scattering, Dispersion relations), Phase shift, Operators (Mathematics), S matrix, Invariance, Field theory, Nuclear resonance.

A study was made of the effects of the virtuality of the nucleon on the pion-nucleon vertex, on the nucleon propagator and on the matrix element for low-energy pion-nucleon scattering. The vertex and propagator can be expressed in terms of the empirical T = 1/2, S 1/2 and P 1/2 pion-N phase-shifts. The influence of a resonance in the latter state is discussed. Pion scattering off a virtual nucleon is studied with the help of one-dimensional dispersion relations. The dependence of the T = J = 3/2 partial-wave amplitude on the squared four-momentum of the virtual nucleon is so determined. (Author)
AD-657 967 Not available from CFSTI.

ANALYTIC THEORY OF SUBCOULOMB STRIPPING. III. EXTENSION TO CASES OF ARBITRARY ANGULAR MOMENTA,
California Inst of Tech Pasadena
Fernando B. Morinigo. 29 Sep 66, 6p
Contract Nonr-220 (47)
See also AD-652 160.
Availability: Published in Nuclear Physics vA95 p571-6 1967.

Descriptors: (*Nuclear cross sections Theory), (*Nuclear reactions, Theory), Momentum, Nuclear spins, Nuclear models, Wave functions, Integrals, Nuclear resonance, Nuclear spectroscopy.
Identifiers: Stripping reactions.

Group 20H—Particle physics

The analytic theory of subcoulomb stripping, which has been previously proposed in detail only for L = 0 stripping, is extended to cases of arbitrary orbital angular momentum and arbitrary spins of the target, projectile, exchanged cluster and emitted cluster. An appropriate analytic parametrization of the effects of wave distortions of the optical-model ype is defined in terms of radial integrals. The analytic formulae for Coulomb-wave amplitudes are rewritten in a closed form which is valid for all L, which is more convenient for numerical evaluation. Explicit expressions are deduced for stripping cross sections for cases in which the initial particles are not polarized and in which the polarizations of the products are not measured. It is conjectured that these formulae may lead to the determination of more consistent values for the reduced widths of levels produced by stripping and to good fits to the angular distributions even in the vicinity of sharp resonances. (Author)
AD-657 968 Not available from CFSTI.

COSMOLOGICAL ELEMENT PRODUCTION,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 3A.
AD-657 969 Not available from CFSTI.

DECAY OF 34Ar,
California Inst of Tech Pasadena
R. G. Miller, and R. W. Kavanagh. 21 Jul 66, 3p
Contract Nonr-220 (47)
Availability: Published in Physics Letters v22 n4 p461-3 Sep 1 1966.

Descriptors: (*Argon, *Decay schemes), Radioactive decay, Half life, Nuclear energy levels, Gamma-ray spectra, Nuclear isobars, Beta decay, Chlorine.

The mass excess and half life measured for argon-34 are -18394 plus or minus 15 keV and 1.2 plus or minus 0.3 s. Decay proceeds to the ground (log ft approx. > 3.60) and 0.67 MeV (3.31 approx. < log ft < 5.16) states of 34Cl. J (pi) = 1 (+) is determined for the state at 0.67 MeV. (Author)
AD-657 970 Not available from CFSTI.

THE DETERMINATION OF THE STATIC QUADRUPOLE MOMENTS OF THE FIRST 2 (+) STATES IN (114)Cd AND (116)Cd BY HIGHER ORDER EFFECTS IN COULOMB EXCITATION,
California Inst of Tech Pasadena
R. G. Stokstad, I. Hall, G. D. Symons, and J. de Boer. 26 Aug 66, 27p
Contracts Nonr-220 (47), AT (04-3)-63
Prepared in cooperation with Rutgers - The State Univ., New Brunswick, N. J.
Availability: Published in Nuclear Physics vA92 p319-44 1967.

Descriptors: (*Cadmium, Nuclear energy levels), (*Nuclear energy levels, Quadrupole moments), (*Nuclear moments, Cadmium), Excitation, Probability, Ion bombardment, Perturbation theory, Nuclear electric moments, Nuclear cross sections.

Measurements of the probabilities for Coulomb excitation of the first 2 (+) states in cadmium-114 and cadmium-116 were made with 4He, 12C and 16O ions. The deviations bserved from first-order perturbation theory are interpreted in terms of the static electric quadrupole moments Q2 of the first 2 (+) states of the two nuclei. The values of these static quadrupole moments are thus found to lie in the range -0.54 > Q2 > -0.90 eb for 114Cd and -0.70 > Q2 > -1.16 eb for 116Cd. The main uncertainty in Q2 arises from a lack of knowledge of the signs f the E2 matrix elements to higher 2 (+) states which also affect the excitation of the first 2 (+) state. (Author)
AD-657 971 Not available from CFSTI.

EFFECTIVE-RANGE THEORY AND THE GROUND STATE OF 8Be,
California Inst of Tech Pasadena
T. A. Tombrello. 5 Aug 66, 3p
Contract Nonr-220 (47)
Availability: Published in Physics Letters v23 n2 p106-8 Oct 10 1966.

Descriptors: (*Beryllium, *Nuclear energy levels), Alpha particles, Elastic scattering, Ground state, Phase shift, Interactions.

It is shown that on the basis of the available data the width of the Beryllium-8 ground state cannot be accurately determined from an effective-range analysis of the S-wave phase shift for alpha-alpha scattering. (Author)
AD-657 972 Not available from CFSTI.

THE ENERGY, LIFETIME, AND SPIN OF THE 1611 keV LEVEL IN 37Ar,
California Inst of Tech Pasadena
D. R. Goosman, and R. W. Kavanagh. 18 Apr 67, 3p
Contract Nonr-220 (47)
Availability: Published in Physics Letters v24B n10 p507-9 May 15 1967.

Descriptors: (*Argon, *Nuclear energy levels), Gamma-ray spectra, Half life, Nuclear spins, Parity, Recoil atoms, Excitation.

The energy of the second excited state of Argon-37 was measured to be 1611 +1 or -1 keV. The half-life was determined by a recoil-Doppler-shift method to be 5.15 +0.7 or -0.7 ns, confirming the spin and parity of this level as 7/2 (-). (Author)
AD-657 973 Not available from CFSTI.

ISOBARIC-SPIN MIXING IN Be8 STATES,
California Inst of Tech Pasadena
J. B. Marion, P. H. Nettles, C. L. Cocke, and C. J. Stephenson, Jr. 21 Nov 66, 8p
Contract Nonr-220 (47)
Availability: Published in The Physical Review v157 n4 p847-53 May 20 1967.

Descriptors: (*Beryllium, *Nuclear energy levels), Nuclear isobars, Nuclear spins, Nuclear spectroscopy, Wave functions, Nuclear cross sections, Excitation, Deuteron reactions.

The Li7 (He3,d)Be8 reaction was studied using a magnetic spectrometer in order to obtain precise values for the widths of the isobaric-spin-mixed states at 16.6 and 16.9 MeV in Be8. The results are Gamma (16.6) = 113 +3 or -3 keV and Gamma (16.9) = 77 +3 or -3 keV. These values specify the isobaric-spin amplitudes of the wave functions for these states and show that, while the mixing is not complete, it is quite substantial. This mixing gives rise to interference effects that are manifest in such reactions as B10 (d,alpha)Be8. It is pointed out that attempts to infer a cross-section ratio sigma (16.6)/sigma (16.9) from such a reaction by taking the areas under the peaks in an experimental energy spectrum can be seriously in error if the interference effects are neglected. The excitation energies for the states were found to be 16.627 plus or minus 0.005 MeV and 16.901 plus or minus 0.005 MeV. (Author)
AD-657 974 Not available from CFSTI.

THE USE OF AN ON-LINE DIGITAL COMPUTER IN CLOSED-LOOP HIGH-ENERGY PHYSICS EXPERIMENTS,
Stanford Univ Calif High Energy Physics Lab
Hall Crannell, M. R. Yearian, Paul Friedl, Charles Sederholm, and William Dye. 1967, 18p Rept no. HEPL-439
Contract Nonr-225 (67)
Prepared in cooperation with IBM Corp., Palo Alto, Calif. Scientific Center.
Availability: Published in The Journal of Computational Physics v1 n3 p305-20 Feb 1967.

Descriptors: (*Digital computers, Nuclear physics), (*Data processing systems, *Nuclear physics), Linear accelerators, Electrons, Input-output devices, Subroutines, Programming languages, Computer logic.
Identifiers: On-line systems.

Since April 1965, IBM and the W. W. Hansen High-Energy Physics Laboratory at Stanford University have been engaged in a joint study of use of on-line computers in high-energy physics experiments. In the High-Energy Laboratory, electrons with energies up to 1.2 BeV, produced by the Stanford Mark III 310-ft linear accelerator, are allowed to bombard various target materials. Electrons, or secondary particles produced by the electrons, are detected with several different kinds of detectors. Information from the detectors is relayed to the data-acquisition area where it is processed and stored, while control information is fed back to nuclear instrumentation by the computer. This paper not only contains a description of the computer and instrument interfaces, but also the application-oriented programming approaches used to operate these devices in various experiments. Several different experiments using the data-acquisition computer system are described, and plans for future modifications and improvements are discussed. (Author)
AD-657 977 Not available from CFSTI.

LEPTONIC TRIPLETS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
Behram Kursunoglu. Aug 67, 11p Rept no. CTS-HE-67-5
Grant AF-AFOSR-1268-67

Descriptors: (*Leptons, *Decay schemes), Neutrinos, Meson reactions, K mesons, Pions, Antiparticles, Wave functions, Groups (Mathematics).

A neutral lepton e-o of mass m-o = 1.00486 m-e and an associated third neutrino nu-o were predicted from a recent theory of baryons and leptons. The decays neutral-K-2 to neutral-pion + antineutrino + neutral-lepton to gamma ray + neutrino neutral-K-2 to antineutrino + neutral-lepton to gamma-ray + neutrino, etc. are discussed for a possible experimental search of these particles. (Author)
AD-657 984 HC$3.00 MF$0.65

NEUTRON SPECTROSCOPY WITH NUCLEAR EMUSLIONS,
Army Nuclear Defense Lab Edgewood Arsenal Md
For primary bibliographic entry see Field 8D.
AD-658 067 HC$3.00 MF$0.65

TENSOR OPERATORS AND MASS FORMULA IN THE MINIMAL EXTENSION OF U3 BY CHARGE CONJUGATION,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 241 Not available from CFSTI.

CALCULATION OF TRANSITION PROBABILITIES FROM NONCOMPACT DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 242 Not available from CFSTI.

MASS-SPIN RELATION IN A LANGRANGIAN MODEL,
Institute for Advanced Study Princeton N J
For primary bibliographic entry see Field 20J.
AD-658 252 Not available from CFSTI.

SOLAR NEUTRINOS FROM THE PROTON - HELIUM THREE REACTION.

Catholic Univ of America Washington D C
For primary bibliographic entry see Field 3B.
AD-658 265 Not available from CFSTI.

MONOPOLE EXCITATIONS AND ELASTIC SCATTERING,
Illinois Univ Urbana
D. G. Ravenhall, D. R. Yennie, B. C. Clark, and R. Herman. 25 Feb 65, 10p
Prepared in cooperation with Cornell Univ., Ithaca, N. Y., and General Motors Corp., Warren, Mich. Research Labs. Research supported in part by NSF and ONR.
Availability: Published in Nuclear Physics v72 p177-86 1965.

Descriptors: (*Nuclear scattering, Moments), (*Elastic scattering, Nuclear cross sections), Nuclei, Nucleons, Carbon, Calcium, Potential scattering, Excitation, Nuclear energy levels.

A simple relationship between elastic scattering amplitudes and monopole excitation amplitudes is pointed out and illustrated. It applies to potential scattering, and can be used for the nucleon-nucleus problem as well as electron-nucleus scattering. The example of scattering of electrons by carbon and calcium is used to illustrate the method. (Author)
AD-658 284 Not available from CFSTI.

ELECTRON SCATTERING BY CALCIUM AT 250 MeV,
Stanford Univ Calif
A. E. Walker, M. R. Yearian, M. Croissiaux, B. C. Clark, and D. G. Ravenhall. 1964, 3p
Prepared in cooperation with Centre de Recherches Nucleaires, General Motors Corp., Warren, Mich., Rome Univ. (Italy), and Illinois Univ., Urbana. Research supported in part by Nonr and NSF.
Availability: Published in Congress International de Physique Nucleaire Paris Jul 2-8 1964.

Descriptors: (*Calcium, Electron bombardment), (*Electrons, *Nuclear scattering), Nuclear structure, Electrostatics, Distribution, Differential cross section.

Electron scattering experiments were carried out in order to obtain further information about the charge distribution on the calcium nucleus. An interesting new feature is the measurement of the differential cross section at very large angles, where a second diffraction dip and subsequent peak are clearly evident.
AD-658 285 Not available from CFSTI.

INELASTIC ELECTRON SCATTERING FROM PROTONS,
Stanford Univ Calif High Energy Physics Lab
H. L. Lynch, J. V. Allaby, and D. M. Ritson. Jul 67, 48p Rept no. HEPL-494-B
Contract Nonr-225 (67)
See also AD-658 289.
Availability: Published in The Physical Review np nd.

Descriptors: (*Electrons, *Inelastic scattering), (*Protons, Electron bombardment), Nuclear cross sections, Nuclear resonance, Photons, Pions.

A large body of data is presented on inelastic electron scattering at energies up to 1.1 GeV. Only the scattered electrons were detected. Part of the measurements were made at fixed momentum transfer and fixed scattered electron energy over a region of energy loss concentrating on the first pion-nucleon resonance. The other measurements were made at fixed momentum transfer and fixed equivalent photon energy in the region of the first resonance, varying the scattered electron energy. The transverse part sigma-t is found to be dominant, but the longitudinal part sigma-s is non-zero at the first resonance. The results suggest that the proton and first resonance share a common magnetic form factor. (Author)
AD-658 288 Not available from CFSTI.

INELASTIC ELECTRON SCATTERING FROM PROTONS: SUPPLEMENT,
Stanford Univ Calif High Energy Physics Lab
Harvey Lynch. Jul 67, 28p Rept no. HEPL-494-A
Contract Nonr-225 (67)
Availability: Published in The Physical Review np nd.

Descriptors: (*Electrons, *Inelastic scattering), (*Protons, Electron bombardment), Nuclear cross sections, Standards, Elastic scattering, Integrals.

This supplement provides details omitted from AD-658 288; these details are concerned with radiative and thick target corrections to inelastic electron scattering and the use of elastic scattering as a standard for normalizing inelastic cross sections.
AD-658 289 Not available from CFSTI.

ELECTRON SCATTERING BY CALCIUM AT 250 MeV,
Stanford Univ Calif
M. Croissiaux, R. Hofstadter, A. E. Walker, D. G. Ravenhall, and B. C. Clark. 25 Sep 64, 9p
Supported in part by ONR and NSF. Prepared in cooperation with Rome Univ. (Italy), Illinois Univ., Urbana, and General Motors Corp., Warren, Mich.
Availability: Published in The Physical Review v137 n4B pB865-73 Feb 23 1965.

Descriptors: (*Calcium, Electron bombardment), (*Electrons, *Nuclear scattering), Elastic scattering, Inelastic scattering, Nuclear cross sections, Nuclear structure, Nuclear models.

The doubly magic nucleus of Ca40 was investigated by the electron scattering technique at an incident energy of 250 MeV. The elastic scattering behavior was resolved from the inelastic scattering, and absolute data on cross sections were obtained for both types of events. In the case of the elastic scattering, the first and second diffraction features were observed and measured. It was possible to make a comparison of the elastic data with theoretical calculations based on a phase-shift analysis for certain assumed models of the nuclear charge density distribution. The combination of such an analysis with the present data, and also with earlier data on the same nucleus, permits the determination of the radius and skin thickness of the Ca40 nucleus with a precision greater than was attainable heretofore. An investigation of the dependence of the density distribution on a third parameter indicates that a Fermi distribution, or models close to this type, are required to fit the experimental data. A Fermi radial charge density distribution with radius c=3.60 F and skin thickness t=2.50 F fits the data extremely well. (Author)
AD-658 290 Not available from CFSTI.

STUDY OF CROSS-SECTION FLUCTUATIONS FOR Li6 + C12 REACTIONS.
Revised ed.,
Minnesota Univ Minneapolis School of Physics and Astronomy
T. G. Dzubay. 17 Feb 67, 7p
Research supported in part by ONR. Revision of manuscript submitted 27 Oct 66.
Availability: Published in The Physical Review v158 n4 p977-83 Jun 20 1967.

Descriptors: (*Lithium, *Nuclear cross sections), (*Carbon, Ion bombardment), Differential cross section, Ion beams, Potential scattering, Nuclear models, Nuclear isobars, Nuclear spins, Alpha particles.

Differential cross-section measurements for Li6+C12 reactions are presented in 100-keV steps between 2.4 and 8.5 MeV at 0 deg. and in 200-keV steps between 3.4 and 7.4 MeV at 40 deg. (lab). Fluctuations in the cross sections are observed at all energies, but they are superimposed upon a rapid rise in cross section for beam energies below 4 MeV due to the Coulomb barrier effects. Coulomb barrier effects are accounted for by calculating the average differential cross section from the Hauser-Feshbach formula in which the transmission coefficients are determined from an optical-model potential. The ratios of the observed-to-calculated cross sections fluctuate about an almost constant value. These ratios are analyzed in terms of the Ericson fluctuation theory from which the coherence width is estimated to be 250 keV (c.m.). The average cross-section ratio for the C12 (Li6,alpha-1)N14 reaction indicates a 30% violation of isobaric-spin conservation in the 3.4- to 6.0-MeV interval. (Author)
AD-658 295 Not available from CFSTI.

COMPARISONS OF SOME SU (6)W PREDICTIONS ON COLLINEAR PROCESSES WITH EXPERIMENT,
Illinois Univ Urbana
J. D. Jackson. 15 Oct 65, 7p
Contract Nonr-1834 (05)
Availability: Published in Physical Review Letters v15 n25 p990-6 Dec 20 1965.

Descriptors: (*Decay schemes, Groups (Mathematics)), (*Nuclear reactions, Predictions), Meson reactions, Baryons, Nuclear spins, Differential cross section, Experimental data.
Identifiers: Symmetry (Quantum mechanics).

Carter et al. (Phys. Rev. Letters v15 p373 1965) have made a large number of predictions for collinear processes on the basis of a relativistic generalization of SU (6) that is common (as a subgroup) to several higher symmetry schemes. Some of these predictions are now compared with existing experimental data and find gross disagreement. Some arguments are given to show that the failures of the predictions are to be expected, and that the symmetry schemes are probably valid (if at all) only for vertices and perhaps for nonperipheral contributions to reaction amplitudes.
AD-658 311 Not available from CFSTI.

CALCULATION OF RELATIVISTIC TRANSITION PROBABILITIES AND FORM FACTORS FROM NONCOMPACT GROUPS,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 360 Not available from CFSTI.

CONVERGENCE OF PADE APPROXIMANTS FOR THE BETHE-SALPETER AMPLITUDE,
Texas A and M Univ College Station Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 361 Not available from CFSTI.

ANALYTIC CONTINUATION OF THE OFF-ENERGY-SHELL SCATTERING AMPLITUDE,
Texas A and M Univ College Station Dept of Physics
For primary bibliographic entry see Field 20J.
AD-658 362 Not available from CFSTI.

STUDIES OF LOW-ENERGY NUCLEAR REACTIONS AND LEVEL DENSITIES FOR MEDIUM-MASS NUCLEI,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 18.
ANL-7289 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, APRIL 1967.
Argonne National Lab., Ill.
16 Jun 67, 111p
Contract W-31-109-eng-38

Descriptors: (*Reactor shutdown, *Power coefficient of reactivity), (*Reactor lattice parameters, *Reactor operation).

For abstract, see NSA 21 17.
ANL-7329 HC$3.00 MF$0.65

NEUTRON CROSS SECTIONS. VOLUME IIC. Z EQUALS 61 TO 87,
Brookhaven National Lab., Upton, N. Y.
Murrey D. Goldberg, Said F. Mughabghab, and Surendra N. Purohit. Aug 66, 439p

Descriptors: (*Neutron cross sections, Nuclear energy), (*Thermal neutrons, Neutron capture gamma rays), Resonance, Spin, Fission, Charged particles, Absorption, Spectrum analyzers.

For abstract, see NSA 21 18.
BNL-325-Suppl-2-Vol-2C HC$3.00 MF$0.65

UNFOLDING PARTICLE SIZE DISTRIBUTIONS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
W. L. Nicholson, and K. R. Merckx. Mar 67, 60p
Contract AT (45-1)-1830

Descriptors: (*Particle size, Density), (*Model theory, Programming languages), Uranium.

For abstract, see NSA 21 17.
BNWL-210 HC$3.00 MF$0.65

COMPILATION OF DOUBLY DIFFERENTIAL CROSS SECTIONS AND THE SCATTERING LAW FOR H2O AND D2O AT 299 DEGREES K AND FOR H2O AT 268 DEGREES K,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
O. K. Harling. Jun 67, 125p
Contract AT (45-1)-1830

Descriptors: (*Thermal neutrons, *Inelastic scattering), Spectrum analyzers, Neutron beams, Freezing, Ice.

For abstract, see NSA 21 18.
BNWL-436 HC$3.00 MF$0.65

PHERMEX A PULSED HIGH-ENERGY RADIOGRAPHIC MACHINE EMITTING X-RAYS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 17.
LA-3241 HC$3.00 MF$0.65

6 Li AND 7 Li DATA IN THE ENDF/B FORMAT,
Los Alamos Scientific Lab., N. Mex.
M. E. Battat, D. J. Dudziak, and R. J. Labauve. Mar 67, 39p
Contract W-7405-eng-36

Descriptors: (*Lithium, *Radioactive isotopes), (*Elastic scattering, Special functions (Mathematical)), Critical assemblies, Neutron cross sections, Excitation.

For abstract, see NSA 21 18.
LA-3695 HC$3.00 MF$0.65

CALIBRATION OF TANDEM ANALYZING MAGNET,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 18.
LA-3699 HC$3.00 MF$0.65

OFFSHELL 1 S ZERO PROTON-PROTON SCATTERING MEDIATED BY A SOFT CORE POTENTIAL,
Los Alamos Scientific Lab., N. Mex.
John E. Brolley, and L. Kent Morrison. May 67, 9p
Contract W-7405-eng-36

Descriptors: (*Protons, *Potential scattering), Velocity, Predictions, Interactions, Electromagnetic fields, Interference.

For abstract, see NSA 21 17.
LA-3706 HC$3.00 MF$0.65

QUARTERLY STATUS REPORT ON THE MEDIUM-ENERGY PHYSICS PROGRAM FOR THE PERIOD ENDING APRIL 30, 1967.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 17.
LA-3712 HC$3.00 MF$0.65

MOUND LABORATORY QUARTERLY PROGRESS REPORT, JULY-SEPTEMBER 1966.
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 17.
MLM-1388 HC$3.00 MF$0.65

DESIGN OF IONIZATION SPECTROMETERS USING IRON AND SCINTILLATORS, FOR THE DETECTION OF HADRONS IN THE 100 TO 1000 BEV RANGE,
Tata Inst. of Fundamental Research, Bombay (India).
D. E. Lyon, Jr. May 67, 22p

Descriptors: (*Cosmic rays, *Spectrum analyzers), (*Scintillation counters, Detection), Ions, Thickness, Instrumentation.

For abstract, see NSA 21 18.
MURA-725 HC$3.00 MF$0.65

COMPILATION, EVALUATION, AND REDUCTION OF NEUTRON DIFFERENTIAL SCATTERING DATA. VOLUME 4,
Atomics International, Canoga Park, Calif.
R. W. Campbell, S. K. Davis, and H. Alter. 3 Apr 67, 288p
Contract AT (04-3)-701

Descriptors: (*Neutron scattering, Experimental data), (*Elastic scattering, Digital computers), Inelastic scattering, Special functions (Mathematical).

For abstract, see NSA 21 17.
NAA-SR-11980-VOL 4 HC$3.00 MF$0.65

FINITE-GEOMETRY AND POLARIZED MULTIPLE- SCATTERING CORRECTIONS OF EXPERIMENTAL FAST -NEUTRON POLARIZATION DATA BY MEANS OF MONTE CARLO METHODS.
Aktiebolaget Atomenergi, Stockholm (Sweden).
O. Aspelund, and B. Gustafsson. Jun 67, 73p AE-284

Descriptors: *Fast neutron, *Monte carlo method, *Neutron scattering, *Polarization, Computer, Correction, Data, Fast, Finite, Geometry, Multiple, Neutron, Program, Scattering.

For abstract, see STAR 05 20.
N67-34003 HC$3.00 MF$0.65

FIRST ADDENDUM TO THE DATA HANDBOOK FOR SENSITIVITY CALCULATIONS IN NEUTRON ACTIVATION ANALYSIS.
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 18D.
For abstract, see STAR 05 20.
N67-34092 HC$3.00 MF$0.65

THE MEASUREMENT OF CHARGE TRANSFER CROSS SECTIONS FOR HIGH ENERGY (DIFFERENCE 1 ME V) PROTONS AND HYDROGEN ATOMS INCIDENT UPON HYDROGEN AND HELIUM GASES.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
J. F. Williams. Sep 66, 29p AAEC/E159

Descriptors: *Charge transfer, *Electron capture, *Hydrogen atom, *Proton, Atom, Capture, Charge, Collision, Cross section, Double, Electron, Gas, High energy, Hydrogen, Measurement, Single, Target, Transfer.

For abstract, see STAR 05 20.
N67-34097 HC$3.00 MF$0.65

CALCULATIONS OF THE THERMAL SCATTERING LAW FOR SOLIDS AND LIQUIDS.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
R. G. Jarvis. Jun 67, 14p AECL-2705, SM-96/23
Presented At the Iaea Symp. on Neutron Thermalization and Reactor Spectra, Ann Arbor, Mich., 17-21 Jul. 1967

Descriptors: *Approximation method, *Incoherent scattering, *Neutron scattering, Approximation, Deuterium, Hydride, Incoherent, Liquid, Method, Model, Neutron, Oxide, Scattering, Solids, Uranium, Water, Zirconium.

For abstract, see STAR 05 20.
N67-34112 HC$3.00 MF$0.65

NEUTRONS FROM D-D-REACTIONS AS A TOOL FOR PLASMA DIAGNOSTICS.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 20.
N67-34168 HC$3.00 MF$0.65

PROPERTIES OF A WIDE GAP SPARK CHAMBER IN MEASUREMENTS OF DIRECTION.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy).
For primary bibliographic entry see Field 18D.
For abstract, see STAR 05 20.
N67-34180 HC$3.00 MF$0.65

SEARCH FOR COSMIC GAMMA RADIATION WITH A VIDICON SPARK CHAMBER FINAL REPORT.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 20.
N67-34299 HC$3.00 MF$0.65

INELASTIC SUM RULES FOR ELECTROMAGNETIC PROCESSES ON NUCLEAR TARGETS.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy).
A. Malecki. 11 May 67, 10p LNF-67/34

Descriptors: *Electromagnetic method, *Nuclear reaction, *Particle production, Cross section, Electromagnetic, Electron, Exchange, Inelasticity, Mathematics, Method, Model, Nuclear, Particle, Photon, Production, Reaction, Rule, Scattering, Sum.

For abstract, see STAR 05 20.
N67-34330 HC$3.00 MF$0.65

APPLICATION OF METHODS COMMON TO ELEMENTARY PARTICLE PHYSICS AND MANY-BODY PROBLEMS FINAL REPORT, 15 NOV. 1965 - 15 MAY 1967.
Rio Grande Do Sul Univ., Porto Alegre (Brazil). Inst. of Physics.
G. Jacob. May 67, 12p REPT.-2, AD-653624
Contract DA-ARO-49-092-66-G102

Descriptors: *Elementary particle, *Quantum electrodynamics, *Symmetry, Current, Electrodynamics, Electron, Elementary, Nuclear, Particle, Perturbation, Physics, Quantum, Reaction, Spin, Theory.

For abstract, see STAR 05 20.
N67-34540 HC$3.00 MF$0.65

ON THE EXTENT TO WHICH COHERENT BREMSSTRAHLUNG FROM CRYTALS CAN BE MONOCHROMATIZED.
Comitato Nazionale Per L Energia Nucleare, Rome (Italy).
G. Bologna. 10 May 67, 13p LNF-67/32
Its Nota Interna No. 363

Descriptors: *Bremsstrahlung, *Coherent radiation, *Monochromatic radiation, *Single crystal, Analysis, Angle, Approximation, Beam, Beryllium, Born approximation, Coherent, Cross, Crystal, Differential, Distribution, Divergence, Electron, Experiment, Folding, High energy, Integration, Monochromatic, Monochromatization, Multiple, Numerical, Polarization, Radiation, Scattering, Section, Single, Small.

For abstract, see STAR 05 20.
N67-34726 HC$3.00 MF$0.65

SYSTEM RESPONSE FUNCTIONS FOR FLIGHT-TIME SPECTROMETRY OF SECONDARY FAST NEUTRONS.
Oak Ridge National Lab., Tenn.
R. T. Santoro. Aug 67, 122p NASA-CR-87805, ORNL-4114
Contract NASA ORDER R-104, W-7405-ENG-26

Descriptors: *Flight time, *Neutron spectrometry, *Spectrometer, *Time response, Channel, Charge, Energy, Flight, Function, Homogeneity, Interaction, Monoenergetic, Neutron, Nucleus, Particle, Region, Response, Secondary, Slab, Spectrometry, Target, Time.

For abstract, see STAR 05 20.
N67-35018 HC$3.00 MF$0.65

ESTIMATES OF PRIMARY AND SECONDARY PARTICLE DOSES BEHIND ALUMINUM AND POLYETHYLENE SLABS DUE TO INCIDENT SOLAR-FLARE AND VAN ALLEN BELT PROTONS,
Oak Ridge National Lab., Tenn.
W. Wayne Scott. Jul 67, 25p

Descriptors: (*Van Allen radiation belt, *Protons), (*Radiological dosage, *Solar flares), (*Radiation hazards, *Cosmic rays), Shielding, Penetration, Kinetic energy, Dose rate.

For abstract, see NSA 21 18.
ORNL-RSIC-18 HC$3.00 MF$0.65

PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3B.
For abstract, see NSA 21 17.
ORNL-4082 HC$3.00 MF$0.65

ELECTRONUCLEAR DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 18.
ORNL-4122 HC$3.00 MF$0.65

A FORTRAN IV PROGRAM FOR CALCULATING GENERAL TENSOR MOMENTS OF POLARIZATION IN NUCLEAR REACTIONS AND SCATTERINGS,
Oak Ridge National Lab., Tenn.
R. D. McCulloch, H. W. Graben, and S. T. Thornton. Jul 67, 96p
Contract W-7405-eng-26

Descriptors: (*Nuclear reactions, Polarization), (*Computer programs, *Nuclear particles), Ion sources, Nuclear scattering.

For abstract, see NSA 21 18.
ORNL-4125 HC$3.00 MF$0.65

PARTICLE INJECTION TECHNIQUES FOR VELOCITY MEASUREMENT IN ARC PLASMAS.
Technical rept.,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
Errol V. Seymour. Dec 64, 62p TR-12
Grant NSF-GP-414

Descriptors: (*Plasma medium, Transport properties), Particles, Equations of motion, Heat transfer, Gas ionization, Argon, Continuum mechanics, Measurement, Vaporization, Thermodynamics.

The report describes the work done to date at Harvard on a particle injection technique for measuring velocity profiles in an ionized gas flowing through a tube. The method consists essentially of injecting small particles under known conditions into the plasma and relating the plasma velocity to the observed motion of the particles. The particles may be observed photographically while within the plasma, or be allowed to leave the plasma and their subsequent motion followed. Both methods involve the problem of interpreting the motion of the particles in terms of the plasma velocity. This is complicated by the fact that the plasma temperature is sufficiently high to cause vaporization of the particles before they reach the same speed as the surrounding gas. (Author)
PB-175 715 HC$3.00 MF$0.65

TWO-MILE ACCELERATOR PROJECT.
Stanford Linear Accelerator Center, Calif.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 17.
SLAC-73 HC$3.00 MF$0.65

PROGRAM BRAGG A FORTRAN-IV PROGRAM FOR CALCULATING BRAGG CURVES AND FLUX DISTRIBUTIONS,
California Univ., Berkeley. Lawrence Radiation Lab.
Gerald M. Litton. 24 Feb 67, 68p
Contract W-7405-eng-48

Descriptors: (*Computer programs, *Mathematical models), Input-output devices, Ion beams, Numerical methods and procedures.

For abstract, see NSA 21 17.
UCRL-17391 HC$3.00 MF$0.65

CONTRACTED BASIS SET ANALYTIC SELF-CONSISTENT FIELD WAVE FUNCTIONS FOR TRANSITION METAL ATOMS,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 7D.
For abstract, see NSA 21 17.
UCRL-50260 HC$3.00 MF$0.65

20I. Plasma Physics

THEORETICAL RESEARCH STUDIES BY REACTING PLASMAS.
Technical administrative rept. no. 1 (Final),
Free Univ., Berlin (Germany).
G. Ludwig. 31 Jul 62, 6p
AFOSR-3537
Grant AF-EOAR-61-48

Descriptors: (*Plasma physics, Quantum mechanics), (*Quantum mechanics, Gases), Kinetic theory, Particles, Statistical processes, Theory, Probability, Partial differential equations, Integral equations, West Germany.

An attempt was made to obtain macroscopical equations to describe plasmas.
AD-460 156 HC$3.00

EXPANSION OF A PARTIALLY-IONIZED GAS THROUGH A SUPERSONIC NOZZLE.
Technical rept.,
California Univ., Berkeley. Div. of Aeronautical Sciences.
L. Talbot, Y. S. Chou, and F. Robben. Aug 65, 54p AS-65-14
Grant AF-AFOSR-538-65

Descriptors: (*Plasma medium, Gas flow), (*Nozzle gas flow, Scattering), (*Supersonic flow, Convergent divergent nozzles), Gas ionization, Recombination reactions, Nonequilibrium flow, Optical properties, Argon, Hydrogen.

A theoretical investigation was made of the nonequilibrium expansion of a partially ionized gas through a supersonic nozzle. Both hydrogen and argon were studied. The energy balance for the electrons and massive particles was studied for both the optically thin (all recombination radiation lost) and optically thick (all radiation absorbed) cases. It was found that the recombination process produces an increase in electron temperature over that of the ion-atom temperature, and that this temperature difference is greater for the optically thick than for the optically thin case. Also, there is more net recombination for the optically thin case. For high initial ionization (62%), recombination affects the gross flow variables measurably, when compared with the 'frozen flow' solution. For low initial ionization (1%) the gross flow variables are practically unaltered, and the principal effect of the recombination is to produce an elevated electron temperature. Electron thermal conductivity effects were found to be unimportant for the frozen and non-equilibrium flows, but should be included in the equilibrium flow calculations. (Author)
AD-471 389 HC$3.00 MF$0.65

TURBULENT SHOCK WAVES IN PLASMAS,
Harvard Radio Astronomy Station Fort Davis Tex
For primary bibliographic entry see Field 4A.
AD-657 534 Not available from CFSTI.

ANALYTICAL STUDIES OF THE EFFECTS OF IONIZATION ON FLUID FLOWS.
Technical rept.,
Ohio State Univ Research Foundation Columbus
T. Chuang, and H. Volkoff. Jun 67, 76p Rept no. TR-6
Contract DA-31-124-ARO (D)-246

Descriptors: (*Magnetohydrodynamics, Laminar boundary layer), (*Laminar boundary layer, *Flat plate models), Ionization, Pressure, Reduction,

Group 20I—Plasma physics

Distortion, Fluid flow, Electrical corona, Electric fields, Stability, Secondary flow, Vortices.
Identifiers: Electrohydrodynamics.

Unusually high pressure drops and flow distortions were observed in a previous experimental program involving laminar flow of a gas in a channel under the action of a corona discharge in a transverse electric field. A hypothesis postulated by Velkoff to explain the phenomenon is extended to the case of laminar boundary layer flow over a flat plate. The problem on hand is found to be analogous to the laminar boundary layer flow in a transverse magnetic field. Three other mechanisms proposed to interpret the above experimental findings are also investigated. The increase in viscosity of a gas because of the ions is not likely and, because of the smallness of ion density, the effect on ion-neutral particle interactions on the flow is believed to be small. One possible mechanism which may explain the phenomenon is the secondary flow resulting from electro-hydrodynamic instability. It is found theoretically that Taylor vortices can be induced in a quiescent fluid between two concentric cylinders under the action of a corona discharge. The Taylor Number of the problem is defined and shown to represent the ratio of the destabilizing electrostatic force to the stabilizing viscous force. It is also found that Goertler vortices can occur in laminar boundary layer over a flat plate provided the applied electric field and the charge density distribution satisfy the condition for instability. (Author)
AD-657 582 HC$3.00 MF$0.65

ON THE EVOLUTION OF THE PROBABILITY DISTRIBUTIONS AND OF THE CORRELATION FUNCTIONS IN A BOGOLUBOV PLASMA.
Interim rept. Jan 66-Apr 67,
Aeronautical Research Associates of Princeton Inc N J
A. Fritz, S. Radin, and G. Sandri. May 67, 46p
ARL-67-0103
Contract AF 33 (615)-1910

Descriptors: (*Plasma medium, Statistical mechanics), Distribution functions, Nonequilibrium flow, Probability, Statistical functions, Interactions, Kinetic theory.

Recently a matrix formulation of nonequilibrium statistical mechanics was developed and applied to dilute gases and to small momentum transfer interactions. The paper shows that the matrix formulation of the nonequilibrium equations can be extended to the Bogolubov gas. The asymptotic behavior is calculated for times long compared with the plasma frequency for: (1) the probability distribution functions, and (2) the Mayer correlation functions. The collision integrals that determine the higher order kinetic equations for the Bogolubov gas are thereby constructed. The calculations performed directly with the nonlinearly-coupled Mayer functions are shown to be equivalent to those performed with the linearly-coupled probability distribution functions. In lowest order the theory coincides with a result obtained previously by Bogolubov. (Author)
AD-657 773 HC$3.00 MF$0.65

NONLINEAR MIXING OF WAVES IN A PLASMA WITH VELOCITY-DEPENDENT COLLISIONS.
Interim technical rept.,
RCA Victor Co Ltd Montreal (Quebec) Research Labs
Issie P. Shkarofsky. May 67, 45p Rept no. RR-7-801-56
ARL-67-0102
Contract AF 33 (615)-2196

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), Nonlinear systems, Interactions, Velocity, Plasma oscillations, Damping, Electric fields, Electrons, Frequency, Distribution functions, Gas ionization, Canada.

The frequency difference, sum and second harmonic currents, due to two interacting waves in a plasma with no external magnetic field, are calculated. The oscillation frequencies are taken to be sufficiently high that ion motion can be neglected. Landau damping is negligible compared to collisional damping. The nonlinearity is due to gradients in the a-c electric fields. The form of the zero order isotropic and non-oscillatory part of the velocity distribution function is left arbitrary. The velocity dependences of the collision frequency of electrons with neutrals, ions and other electrons are properly accounted for. The Fokker-Planck equation in its integro-differential form and including nonlinear terms is used for electron-electron collisions. The self-consistent electric field is included with nonlinear terms. Results are given (a) for any degree of ionization provided the lowest frequency in the mixing process is greater than the total collision frequency and (b) for a slightly ionized gas for any ratio of oscillation to collision frequency. In the former case, it is shown that electron-electron effects do not contribute to the nonlinear current arising from wave-mixing but contribute to the nonlinear self-consistent electric field. (Author)
AD-657 774 HC$3.00 MF$0.65

THE PHYSICS OF METASTABLE SYSTEMS.
Texas Univ Austin Dept of Physics
For primary bibliographic entry see Field 7D.
AD-657 805 HC$3.00 MF$0.65

BASIC PLASMA PROCESSES.
Yearly summary technical rept. 16 Nov 65-30 Jun 67,
Westinghouse Research Labs Pittsburgh Pa Atomic and Molecular Sciences
A. V. Phelps, and C. L. Chen. 21 Jul 67, 37p Rept no. 67-9E2-GASES-R1
Contract Nonr-4725 (00)

Descriptors: (*Cesium, Resonance absorption), (*Plasma physics, *Energy conversion), Line spectrum, Atomic energy levels, Monochromators, Vapors, Alkali metals, Thermionic converters, Magnetohydrodynamic generators.

An experimental study of the self-broadening of cesium resonance lines was made using measurements of the transmission of white light through a cell filled with Cs. Discrepancies between previous results were resolved in favor of the older results of Gregory. It was found that recent investigators have not taken proper account of the transmission characteristics of the monochromator used in the measurements. The understanding of the role of the monochromator makes available an additional technique for the measurement of cesium and other metal vapors in power conversion devices. The results of exploratory measurements of the scattering of resonance radiation are discussed. (Author)
AD-657 864 HC$3.00 MF$0.65

STABILIZATION OF HELICAL MODES BY MAGNETIC WELLS,
General Dynamics San Diego Calif General Atomic Div
T. K. Fowler. 6 Oct 66, 4p
AFOSR-67-2076
Contract AF 49 (638)-1546
Availability: Published in Physics of Fluids v10 n2 p469-70 Feb 1967.

Descriptors: (*Plasma physics, Stabilization), (*Ionization trails, *Gases), (*Solids, Ionization trails), Turbulence, Magnetic fields, Electrons, Ions, Energy, Theory.

Helical modes are found to be stabilized by magnetic wells of finite but small depth, and thus provide a practical test of the general principle of stabilization by deep wells. (Author)
AD-657 892 Not available from CFSTI.

KINETIC EQUATION WITH ELECTROMAGNETIC INTERACTIONS,
Northwestern Univ Evanston Ill Technological Inst
J. T. Hogan, and M. B. Lewis. 20 Jan 67, 8p
Availability: Published in The Physics of Fluids v10 n4 p723-30 Apr 1967.

Descriptors: (*Kinetic theory, *Plasma physics), Electromagnetic properties, Interactions, Plasma medium, Equations.

A kinetic equation for a plasma with electromagnetic interactions is derived in the shielding approximation. The equation is the analog of the Landau equation and has the same structure as the Landau equation but with a velocity dependent interaction replacing the Coulomb interaction. (Author)
AD-657 916 Not available from CFSTI.

ACOUSTIC KINK INSTABILITY IN AN ARGON DISCHARGE,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Michael Schultz, and Uno Ingard. 14 Nov 66, 6p
Contracts DA-36-039-AMC-03200 (E), Nonr-1841 (42)
Availability: Published in Physics of Fluids v10 n5 p1031-6 May 1967.

Descriptors: (*Argon, Gas discharges), (*Gas discharges, *Acoustics), Stability, Discharge tubes.

An experimental investigation of an acoustic instability of a current-modulated argon discharge in a cylindrical tube is described. When the modulation frequency is coincident with that of a nonaxial acoustic mode of the discharge cavity, the initially straight axial discharge path is deformed into a stationary path in which the lateral displacement has a spatial periodicity along the axis of the tube. This instability occurs only when the modulation exceeds some minimum amplitude and is associated with the excitation of a nonaxial acoustic mode of the gas in the discharge tube. It is shown that the spatial periodicities of the discharge path and the acoustic mode are the same. A proposed explanation of the instability is presented in terms of the acoustic coupling between the discharge and nonaxial acoustic modes and the effect of the acoustic pressure field on the resistance of the discharge. (Author)
AD-657 923 Not available from CFSTI.

A GENERAL FORMULATION AND SOLUTION OF CHEMICAL RATE EQUATIONS FOR USE IN NON-EQUILIBRIUM COMBUSTION STUDIES,
California Univ Berkeley Thermal Systems Div
For primary bibliographic entry see Field 20B.
AD-658 004 HC$3.00 MF$0.65

STABILITY OF HELMHOLTZ PLASMA FLOW IN A DISCONTINUOUS MAGNETIC FIELD,
Innsbruck Univ (Austria) Inst for Theoretical Physics
Franz Herrnegger. 27 Jun 67, 14p Rept no. Scientific-47
AFOSR-67-2066
Contract F61052-67-C-0014

Descriptors: (*Magnetohydrodynamics, Stability), Integral transforms, Plasma medium, Incompressible flow, Magnetic fields, Austria.

An investigation is made of linear stability effects of time dependent plasma flow of Helmholtz type in a discontinuous magnetic field by means of Laplace transforms. The stabilities arise because of a tangential discontinuity of velocities between two streams of a homogeneous, nondissipative, incompressible, isotropic plasma. The plasma is

characterised by a negative Richardson number and constant Alfven velocity which has a jump at the interface. (Author)
AD-658 044 HC$3.00 MF$0.65

THEORETICAL ANALYSIS OF A COAXIAL HALL ACCELERATOR,
Innsbruck Univ (Austria) Inst for Theoretical Physics
K. Lackner. 6 Mar 67, 23p Rept no. Scientific-45
AFOSR-67-2073
Contract F61052-67-C-0014

Descriptors: (*Plasma accelerators, Hall effect), Theory, Magnetohydrodynamics, Electrical conductance, Gas flow, Mach number, Austria.

The coaxial Hall current accelerator is investigated theoretically taking account of ion slip, variable electrical conductivity and variable magnetic field strength. The operating regimes are outlined and closed analytical solution is given for the axial variation of the flow parameters. (Author)
AD-658 045 HC$3.00 MF$0.65

ARC STRUCTURE IN A MAGNETIC ANNULAR DISCHARGE.
Research rept.,
Avco Everett Research Lab Everett Mass
J. B. Workman. Jun 67, 51p Rept no. AERL-RR-277
AFOSR-67-2049
Contracts AF 49 (638)-1483, NAS3-8907

Descriptors: (*Magnetohydrodynamics, *Gas discharges), Electric arcs, Magnetic fields, Plasma accelerators, Numerical analysis, Hydrogen, Diffusion.

The structure of an arc in a magnetic annular discharge in hydrogen was computed numerically using non-equilibrium, quasi-one dimensional multicomponent hydrodynamics. The analysis substantiates recent experimental observations of a narrow current and ionization zone near the throat that is distinct from the complicated flow in the supersonic expansion. The numerical results suggest a simple diffusion and heating model for the subsonic portion of the arc. This model gives the important physical processes and permits the development of elementary relations which are useful for estimating parametric behavior. Specifically, formulas are derived giving the scale length of the discharge, fraction ionized, and the relationship between electrical power and flow parameters. Certain constants that are needed by the simple model are deduced by matching the results to the numerical analysis. (Author)
AD-658 050 HC$3.00 MF$0.65

RESEARCH ON PLASMA DIAGNOSTIC METHODS FOR HIGH TEMPERATURE PLASMA RESEARCH.
Final scientific rept. 1 Apr 65-31 Dec 66,
Texas Univ Austin
Arwin A. Dougal, Otto M. Friedrich, Jr., M. O. Hagler, D. J. Mayhall, and Frederic Weigl. Mar 67, 126p
ARL-67-0062
Contract AF 33 (615)-3124

Descriptors: (*Plasma medium, *Electron density), Interferometers, Masers, Lasers, Infrared radiation, High-temperature research, Plasma generators, Magnetic pinch, Plasma physics, Ruby, Shock waves, Probes.
Identifiers: Plasma diagnostics.

A new experimental arrangement of the infrared maser-interferometer detector combination employed to investigate dynamical gaseous plasmas and narrow, rapidly moving cylindrical detached shocks in a 30 kilojoule theta pinch was conceived, fabricated, and tested. This maser-interferometer-detector system has markedly improved frequency response. Because of its usefulness in determining the electron density from laser interferometry data, an expression for the laser resonator energy density as a function of the second resonator length was derived, under the assumption of dielectric mirrors. A Fabry-Perot interferometer in which the plane mirrors of infinite extent are prefaced by Brewster windows, and plane electromagnetic waves propagate along the z-axis through a lasing medium immersed in a steady state magnetic field was considered. The effect of the magnetic field on resonator tuning, on critical gain requirements, and on the polarization of the laser output beam were investigated. The advent of the giant pulse ruby laser as an extremely powerful energy source has provided the plasma researcher with a means of producing ultra-pure plasmas in which electron densities may range as high as 10 to the 21st power electrons/cc. A giant pulse ruby laser illuminated Mach-Zehnder interferometer is employed to study laser induced discharges in air at atmospheric pressure. Strong blast wave theory was employed to investigate the dynamics of gaseous plasmas produced when a giant pulse ruby laser was focused in gases initially at 1-2000 atmospheres.
AD-658 052 HC$3.00 MF$0.65

FINITE AMPLITUDE INSTABILITIES IN WEAKLY IONIZED GASES AND SOLIDS,
Boeing Scientific Research Labs Seattle Wash Plasma Physics Lab
Roy R. Johnson, and O. Holter. Jun 67, 103p Rept no. D1-82-0626
Prepared in cooperation with Olso Univ. (Norway), Inst. of Physics. Notes for a series of lectures presented at the Orsay Inst. of Non-Linear Effects in Plasmas (2nd), Orsay (France), Sep 66.

Descriptors: (*Plasma medium, Stability), (*Semiconductors, Plasma medium), Magnetic fields, Perturbation theory, Excitation, Carriers (Semiconductors), Ionization, Helixes, Norway.

A study of macroscopic instabilities which can have a finite amplitude is presented. Beginning with the helical instability for the positive column in a longitudinal magnetic field as derived from a perturbation analysis, the theory is generalized to include the region of magnetic fields where the amplitude of the instability can no longer be considered small relative to the time averaged background plasma density. The theory of the finite amplitude helical instability includes calculations of the hysteresis effect, frequency and wavelength of the helix, and the internal magnetic field. The conditions whereby the finite amplitude helical instability can cause the excitation of higher modes will then be investigated. Experimental evidence of the behavior of the helical instability is presented for comparison with the theory. The theory for the helical instability in solid state plasmas is then developed. This includes a study of the behavior of plasmas caused by injection and impact ionization in addition to the thermal carriers. Finally, experimental results of the helical instability observed in semiconductor plasmas is presented. (Author)
AD-658 160 HC$3.00 MF$0.65

NUMERICAL EXPERIMENTS OF MAGNETOHYDRODYNAMIC SHOCKS AND THE STABILITY OF SWITCH-ON SHOCKS,
Columbia Univ New York
C. K. Chu, and Robert T. Taussig. 14 Oct 66, 11p
AFOSR-67-2078
Contract AF 49 (638)-1634
Availability: Published in The Physics of Fluids v10 n2 p249-56 Feb 1967.

Descriptors: (*Magnetohydrodynamics, *Shock waves), Stability, Numerical analysis, Dissipation factor, Linear systems, Fluid dynamic properties.

Numerical experiments are performed on a variety of magnetohydrodynamic shock waves to determine their behavior in a dissipative fluid. The Lundquist equations are integrated with Lax's finite difference scheme in which physical dissipation is imitiated by numerical dissipation. Fast and slow magnetohydrodynamic shocks respond to small disturbances just as predicted by linear nondissipative theory. The disintegration of an intermediate (nonevolutionary) shock is followed in time to its final (stable) flow pattern. In this case, the disturbance builds up inside the structure to a maximum, and the shock splits into two shocks (e.g. a switch-on and a switch-off shock) separated by a uniform region. This analysis gives the qualitatively correct time behavior of the splitting which, for small time, agrees with previous linearized dissipative results. The magnetohydrodynamic switch-on shock is examined using the same techniques. Small transverse disturbances, which might split the shock according to a linear analysis, merely rotate the magnetic field in the plane of the shock (repolarize the shock) and leave an Alfven wave tail behind it. The fluid dynamic properties of the shock are not changed, the shock does not split, and therefore the switch-on shock is stable. In short, this approach overcomes the insufficiencies of linear, nondissipative analyses and gives physically realistic and reasonable answers to the long unresolved questions of magnetohydrodynamic shock stability. (Author)
AD-658 253 Not available from CFSTI.

LANDAU DAMPING AND GROWTH OF ELECTROSTATIC MODES WITH EFFECTS OF SPATIAL VARIATION.
Revised ed.,
General Dynamics San Diego Calif General Atomic Div
David L. Book. 16 Sep 66, 8p
AFOSR-67-2089
Contracts AF 49 (638)-1546, NAS7-275
Revision of manuscript submitted 29 Jul 65. Prepared in cooperation with John Jay Hopkins Lab. for Pure and Applied Science, San Diego, Calif.
Availability: Published in The Physics of Fluids v10 n1 p198-203 Jan 1967.

Descriptors: (*Magnetohydrodynamics, Damping), Propagation, Plasma oscillations, Velocity, Distribution functions, Stability.
Identifiers: Landau damping.

For a plasma with finite cross section of the sort which occurs typically in laboratory plasma waves experiments, in a constant magnetic field, the Landau damping (or growth) is obtained by a perturbation procedure in terms of the plasma velocity distribution function and potential and density profiles. The result is applied to the damping associated with the upper and lower branches of the dispersion curve for longitudinal electron plasma waves in the case of a Maxwellian velocity distribution in slab and cylindrical geometries. Application is also made to the growth rates resulting from a low-density electron beam with radially dependent energy superposed on a Maxwellian. (Author)
AD-658 259 Not available from CFSTI.

EXPERIMENTAL STUDY OF NORMAL IONIZING SHOCK WAVES.
Revised ed.,
Columbia Univ New York Plasma Lab
Bennett Miller. 4 Oct 66, 11p
AFOSR-67-2079
Contract AF 49 (638)-1254
Doctoral thesis. Revision of manuscript submitted 8 Nov 65.
Availability: Published in The Physics of Fluids v10 n1 p9-16 Jan 1967.

Descriptors: (*Shock waves, *Magnetohydrodynamics), Electromagnetic waves, Shock tubes, Propagation, Plasma medium, Ionization.

A coaxial electromagnetic shock tube was used to study normal ionizing shocks propagating

through hydrogen. An experiment is described which produced plane switch-on ionizing shocks. Quantitative studies were conducted covering the sub-Alfvenic and trans-Alfvenic regimes. Data are presented that support the existence of switch-on fronts in both these regimes, thereby demonstrating the significant effect of the initial electric field on the shock jump conditions. The results are interpreted by appeal to Taussig's theory of normal ionizing shocks. To choose from among the several theoretically predicted ionizing waves propagating at a given speed, Taussig's theory is supplemented by a simple physical criterion modeled on the Chapman-Jouguet hypothesis of Gross and Kunkel. This criterion has strong intuitive support and results in a picture of ionizing shock propagation that is in general agreement with the experimental observations. (Author)
AD-658 273 Not available from CFSTI.

THEORETICAL ANALYSIS OF PLASMA CONFINEMENT IN A ROTATING MAGNETIC FIELD,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
D. K. Taylor. 25 Jan 61, 33p Rept no. CF-2915
Contract NOrd-7386

Descriptors: (*Plasma medium, Containment), Charged particles, Particle trajectories, Magnetic fields, Cyclotron resonance phenomena, Equations of motion, Stability, Magnetic pinch.
Identifiers: Magnetic bottles.

The physical reasoning which led to the conclusion that particle trajectories in a rotating field are stable in the plane of rotation is reviewed as an introduction to the concept of plasma confinement in a rotating field. The magnetic field's relation to Maxwell's equations is discussed and the induced electric field is presented, whereupon the equations of motion and their exact general solutions are given. The orbits of particles are derived for special limiting cases on the basis of the general solutions, and the orbits are compared with the analog computer solutions of the equations. It is shown that a rotating magnetic field alone is not enough to confine a plasma, but that the rotating field used in conjunction with other types of stationary fields should result in an effective plasma containment device. Finally, two additional, physically-possible rotating fields are introduced and their properties are discussed briefly. (Author)
AD-658 383 HC$3.00 MF$0.65

PROCEEDINGS OF THE 1966 SYMPOSIUM ON ENGINEERING PROBLEMS OF CONTROLLED THERMONUCLEAR RESEARCH HELD OCTOBER 3-6, 1966, IN GATLINBURG, TENNESSEE.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 17.
CONF-661016 HC$3.00 MF$0.65

ANNUAL REPORT, JANUARY 1-DECEMBER 31, 1966.
Princeton Univ., N. J. Plasma Physics Lab.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 18.
MATT-Q-24 HC$3.00 MF$0.65

INVESTIGATION ON THE COMPRESSION AND THE CONTAINMENT OF A PLASMA IN CUSP GEOMETRY.
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Plasmaphysik.
H. J. Belitz, and E. Kugler. Jan 67, 15p JUL-457-PP
Presented At the First European Conf. on Controlled Fusion and Plasma Phys., Munich, 1966

Descriptors: *Electron temperature, *Hydrogen plasma, *Ionized gas, *Magnetic field, Containment, Cusp, Decay, Density, Electron, Field, Gas, Geometry, Hydrogen, Ionized, Magnetic, Plasma, Stability, Temperature.

For abstract, see STAR 05 20.
N67-34035 HC$3.00 MF$0.65

ANOMALOUS DIFFUSION OF AN AFTER-GLOW-PLASMA.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
T. Dodo. May 67, 24p IPP-2/62

Descriptors: *Diffusion coefficient, *Gas pressure, *Helium afterglow, *Magnetic field, Afterglow, Anomaly, Chamber, Coefficient, Density, Diffusion, Field, Gas, Helium, Ion, Magnetic, Metal, Neutral, Plasma, Pressure, Strength.

For abstract, see STAR 05 20.
N67-34162 HC$3.00 MF$0.65

SOME PHENOMENA OCCURRING DURING THE INTERACTION OF AN ELECTRON BEAM WITH A MAGNETOPLASMA.
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
W. Herrmann. Apr 67, 46p IPP-2/61

Descriptors: *Electron beam, *Magnetoplasma, *Oscillation frequency, *Plasma turbulence, Beam, Calculation, Chamber, Dispersion, Distribution, Electron, Energy, Frequency, Interaction, Oscillation, Plasma, Relation, Temperature, Tensor, Turbulence.

For abstract, see STAR 05 20.
N67-34166 HC$3.00 MF$0.65

NEUTRONS FROM D-D-REACTIONS AS A TOOL FOR PLASMA DIAGNOSTICS.
Reacktionsneutronen Als Hilfsmittel Der Plasmadiagnostik
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
G. Lehner, and F. Pohl. Mar 67, 34p IPP-1/60
in German, English Summary

Descriptors: *Deuterium plasma, *Deuteron, *Neutron, *Particle production, *Plasma diagnostics, Anisotropy, Deuterium, Diagnostics, Distribution, Energy, Flux, Ion, Particle, Plasma, Production, Spectrum, Velocity.

For abstract, see STAR 05 20.
N67-34168 HC$3.00 MF$0.65

INVESTIGATION OF THE IONIZATION OF HYDROGEN IN ELECTRICAL RING FIELDS WITH MICROWAVE DIAGNOSTICS.
Untersuchung Der Ionisierung Von Wasserstoff in Elektrischen Ringfeldern Mit Mikrowellendiagnostik
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Plasmaphysik.
H. Beerwald. Apr 67, 57p JUL-480-PP
in German

Descriptors: *Electric field, *Electron density, *Hydrogen plasma, *Ionized gas, *Microwave interferometer, Bibliography, Circular, Density, Discharge, Electric, Electron, Field, Gas, Hydrogen, Interferometry, Ionized, Magnetic, Microwave, Plasma, Pressure, Production, Strength.

For abstract, see STAR 05 20.
N67-34201 HC$3.00 MF$0.65

DIELECTRIC CONDUCTORS AND ANTENNAS FOR 2MM MICROWAVE INTERFEROMETER OF HIGH VOLUME RESOLUTION FOR DENSITY MEASUREMENTS OF PLASMAS.
Dielektrische Leiter Und Antennen Fuer 2mm-Mikrowelleninterferometer
Hoher Raeumlicher Aufloesung Zur Dichtemessung An Plasmen
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Plasmaphysik.
H. Hartwig. Apr 67, 16p JUL-473-PP
in German

Descriptors: *Dielectric polarization, *Microwave interferometer, *Plasma density, Antenna, Conductor, Density, Dielectric, Discharge, Electric, Guide, Interferometer, Microwave, Pattern, Plasma, Polarization, Quartz, Radiation, Resolution, Spatial, Wave.

For abstract, see STAR 05 20.
N67-34226 HC$3.00 MF$0.65

THE HELICAL INSTABILITY OF THE POSITIVE COLUMN IN CROSSED FIELDS AND IN ANNULAR PLASMA CONFIGURATIONS INTERIM REPORT.
Rensselaer Polytechnic Inst., Troy, N. Y. Plasma Dynamics Lab.
E. H. Holt, and J. F. Reynolds. Aug 67, 10p
NASA-CR-87412, TR-67-4
Contract NGR-33-018-075
Presented At the 8th Intern. Conf. on Phenomena in Ionized Cases, Vienna, 28 Aug. - 2 Sep. 1967

Descriptors: *Crossed field, *Instability, *Plasma physics, Collision, Column, Configuration, Crossed, Field, Helical, Physics, Plasma, Solenoid, Stabilization.

For abstract, see STAR 05 20.
N67-34308 HC$3.00 MF$0.65

RESONANCE RECTIFICATION EFFECTS IN WARM MAGNETOPLASMAS.
Stanford Univ., Calif. Inst. for Plasma Research.
F. W. Crawford, R. S. Harp, and T. D. Mantœ.
Aug 67, 33p NASA-CR-87497, SU-IPR-177
Contract NGR-05-020-077

Descriptors: *Magnetoplasma, *Rectification, *Resonance, Electron, Magnetic field, Temperature, Theory.

For abstract, see STAR 05 20.
N67-34321 HC$3.00 MF$0.65

LOSS CONE INSTABILITY IN THE STELLARATOR.
United Kingdom Atomic Energy Authority, Culham (England).
A. A. Galeev. 1966, 11p CTO/366, NP-TR-1530
Transl. Into English of Preprint No. 10 of Inst. of Nucl. Phys., Siberian Branch, USSR Acad. of Sci., Novosibirk, 1966 P 1-11

Descriptors: *Instability, *Toroidal plasma, *Velocity distribution, Distribution, Drift, Electron, Field, Force, Ion, Lifetime, Magnetic, Plasma, Toroid, Trap, Velocity.

For abstract, see STAR 05 20.
N67-34445 HC$3.00 MF$0.65

ON THE MEASURABILITY OF PLASMA DRIFT VELOCITY AND LORENTZ POLARIZATION TERM BY MEANS OF MICROWAVE DRAGGING EXPERIMENTS.
Uber Die Messbarkeit Der Plasmadriftgeschwindigke
it Und des Lorentz- Polarisationsterms Durch Mikrowellen- Mitfuerhrungsexperimente
Institut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
M. Tutter. Jul 67, 14p IPP-3/55
in German, English Summary

Descriptors: *Drift rate, *Lorentz force, *Plasma dispersion, Dispersion, Drag, Drift, Electric, Elec-

tromagnetic, Field, Measurement, Microwave, Plasma, Polarization, Rate, Velocity, Wave.

For abstract, see STAR 05 20.
N67-34686 HC$3.00 MF$0.65

PLASMA BOUNDARY INTERACTIONS.
Space Sciences, Inc., Waltham, Mass.
S. Aisenberg, P. Hu, V. Rohatgi, and S. Ziering.
Aug 67, 91p NASA-CR-868
Contract NASW-1014

Descriptors: *Boundary layer, *Electrode, *High energy interaction, *Plasma-electromagnetic interaction, *Surface interaction, Arc, Boundary, Cathode, Continuum, Dependence, Design, Device, Drag, Electromagnetic, Electron, Emission, Energy, Field, High energy, Interaction, Ionization, Kinetic, Layer, Magnetic, Measurement, Model, Moving, Plasma, Retrograde, Sheath, Surface, Theory, Transfer, Voltage.

For abstract, see STAR 05 20.
N67-34915 HC$3.00 MF$0.65

MEASUREMENT OF THE IONIZATION BEHIND HIGH VELOCITY PROJECTILES USING A CAVITY RESONATOR AND A HYPERFREQUENCY INTERFEROMETER.
Mesure de l'Ionisation Derriere des Project- Iles A Grand Vitesse, A l'Aide D'une Cavite Resonnante Et D'un Interferometre Hyperfrequence
Institut Franco-allemand de Recherches, St. Louis (France).
M. Laug. 4 Oct 65, 36p ISL-T-31/65
Contract SEREB-31-07
in French

Descriptors: *Cavity resonator, *Hypervelocity projectile, *Ionized gas, *Microwave interferometer, Cavity, Damping, Density, Dynamics, Gas, Hypervelocity, Interferometer, Ionization, Measurement, Microwave, Plasma, Projectile, Resonator, Shock, Tunnel, Wave.

For abstract, see STAR 05 20.
N67-35184 HC$3.00 MF$0.65

PARTICLE INJECTION TECHNIQUES FOR VELOCITY MEASUREMENT IN ARC PLASMAS.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 20H.
PB-175 715 HC$3.00 MF$0.65

INVESTIGATION OF THE HIGH PRESSURE HELIUM ARC PLASMA BY MICROWAVE CAVITY TECHNIQUES.
Technical rept.,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
William T. Maloney. Jun 65, 35p TR-17
Grant NSF-GK-65

Descriptors: (*Plasma medium, High-pressure research), Helium, Contamination, Microwaves, Barometric pressure, Gas ionization, Sensitivity.

The microwave cavity diagnostic techniques previously developed in connection with the Poiseuille argon arc plasma are here applied to the study of a steady state atmospheric pressure helium arc plasma flowing through a 1 cm circular copper pipe at a flow rate of 7240 ml/min. Arc currents range from 5 to 30 A. As before, the measurement of a microwave cavity resonant frequency is interpreted as a measurement of the 'diameter' of the plasma column. The diameters, however, exhibit a transient and an irreproducibility in final values which is clearly attributable to contamination of the arc -- contamination which persists even with chemical cleaning of the candle, evacuation of the candle below 1 micron between runs and the cleanest available financially feasible helium gas. One ppm change in the water vapor content of this helium suffices to produce a 25 percent change in the arc current I ARC required for constant diameter. The microwave cavity technique provides an extremely sensitive monotor of the state of gas purity. (Author)
PB-175 717 HC$3.00 MF$0.65

BOUNDARY-LAYER STABILITY DIAGRAMS FOR ELECTRICALLY CONDUCTING FLUIDS IN THE PRESENCE OF A MAGNETIC FIELD.
Technical rept..
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Vernon J. Rossow. 1 May 58, 19p NASA-TR-R-37

Descriptors: (*Magnetohydrodynamics, *Laminar flow), Boundary layer, Stability, Electrical conductance, Magnetic fields, Fluids, Incompressible flow, Flat plate models.

Neutral stability curves pertaining to a two-dimensional infinitesimal sinusoidal disturbance are presented for the laminar flow of an incompressible, electrically conducting fluid over a semi-infinite flat plate in the presence of either a coplanar or transverse magnetic field. The magnetic field is found to be stabilizing in all of the cases studied except one. (Author)
PB-175 911 HC$3.00 MF$0.65

A RELATIVISTIC CALCULATION OF THE BREMSSTRAHLUNG SPECTRUM OF A MAXWELL-BOLTZMANN PLASMA,
California Univ., Livermore. Lawrence Radiation Lab.
Chris Quigg. 6 Apr 67, 24p
Contract W-7405-eng-48

Descriptors: (*Bremsstrahlung, *Plasma medium), (*Plasma physics, *Continuous spectrum), Charged particles.

For abstract, see NSA 21 17.
UCRL-50227 HC$3.00 MF$0.65

20J. Quantum Theory

ALGEBRA OF CURRENTS AND THE VECTOR-MESON-BARYON COUPLING CONSTANTS IN BROKEN SU (3),
Indiana Univ Bloomington Dept of Physics
C. S. Lai. 7 Nov 66, 7p
AROD-5992:6
Grant DA-ARO (D)-31-124-G766
Availability: Published in Physical Review v155 n5 p1562-5 Mar 25 1967.

Descriptors: (*Mesons, Interactions), (*Baryons, Interactions), Algebras, Groups (Mathematics), Tensor analysis, Invariance.
Identifiers: Current algebras, Partial conservation of tensor currents, Sum rules, Symmetry (Quantum mechanics), Vector analysis.

Employing the method of current algebra and a hypothesis of partially conserved tensor current, a study was made of the renormalization effects on the vector-meson-baryon coupling constants, due to the first-order SU (3) breaking. It was found that the sum rules within the couplings of one vector meson with baryons are the same as those found in the SU (3) limit, and that the renormalization effects are present only when the coupling of one vector meson is compared with the couplings of different vector mesons. With the use of omega-phi mixing with the mixing angle Theta = (1/tan) (sq. rt. of 1/2), the rho and omega couplings have the same amount of renormalization effects. (Author)
AD-657 545 Not available from CFSTI.

CONSTRUCTION OF EIGENFUNCTION EXPANSIONS BY THE PERTURBATION METHOD AND ITS APPLICATION TO n-DIMENSIONAL SCHRODINGER OPERATIONS.
Wisconsin Univ Madison Mathematics Research Center
For primary bibliographic entry see Field 12A.
AD-657 566 HC$3.00 MF$0.65

PARTIAL SYMMETRY,
Harvard Univ Cambridge Mass
Julian Schwinger. 17 Apr 67, 6p
AFOSR-67-1960
Contract AF 49 (638)1380
Availability: Published in Physical Review Letters v18 n21 p923-6 May 22 1967.

Descriptors: (*Elementary particles, Groups (Mathematics)), Nuclear spins, Interactions, Nuclear magnetic moments, Decay schemes.
Identifiers: Symmetry (Quantum mechanics).

Partial symmetry is proposed as the general basis for a phenomenological method that replaces current algebra. Its practical merit is displayed through a reinterpretation of combined internal and spin transformations. Among various results referring to coupling constants, magnetic moments, and electromagnetic decays, the following is noted: (-G sub A)/ (G sub V)= (2 to the -1/2 power) (5/3)=1.18. (Author)
AD-657 656 Not available from CFSTI.

ELECTRODYNAMICS OF MOVING MEDIA.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-657 672 Not available from CFSTI.

A USEFUL MATRIX INVERSION FORMULA AND ITS APPLICATIONS.
Syracuse Univ N Y Dept of Electrical Engineering
For primary bibliographic entry see Field 12A.
AD-657 711 Not available from CFSTI.

SCATTERING FROM COULOMB-LIKE POTENTIALS WITHOUT DIVERGENCES OR CUTOFFS. I. FORMALISM: GENERALIZED LIPPMANN-SCHWINGER EQUATIONS,
Stanford Univ Calif Dept of Physics
Geoffrey B. West. 6 Oct 66, 14p
AFOSR-67-2031
Contract AF 49 (638)-1389
Availability: Published in Journal of Mathematical Physics v8 n4 p942-53 Apr 1967.

Descriptors: (*Potential scattering, *Integral equations), Green's function, Wave functions, Integration, Perturbation theory, Pions, Meson scattering, Alpha particle reactions.
Identifiers: Lippmann-Schwinger equations.

A general method is presented whereby integral equations, which govern the solution to the radial Schrodinger equation, can be derived. The equations are quite flexible and can be arranged so as to define divergenceless iterative procedures. They are therefore particularly useful for Coulombic and singular potentials, neither of which are normally covered by the standard theory. The standard theory was examined as applied to Coulombic potentials; this is generally characterized by logarithmic divergences. It is shown that the standard Lippmann-Schwinger equation is no longer applicable and must be replaced by the corresponding homogeneous integral equation. Furthermore, it is demonstrated that the T matrix, as conventionally defined, vanishes. Upon application of the generalized integral equation, a perturbative result for the scattering amplitude is obtained without the appearance of divergences of cutoffs. In the case of a pure point Coulomb potential, this

result agrees very favorably with the exact one. In the modified case, the expression, by virtue of the fact that it does not require knowledge of Coulomb wavefunctions, is much simpler for computational purposes than the standard expressions. One simple example of the application of this method to singular potential is briefly discussed. (Author)
AD-657 713 Not available from CFSTI.

FURTHER CONSEQUENCES OF THE QUARK MODEL IN INELASTIC MESON-BARYON SCATTERING,
Stanford Univ Calif
J. L. Friar, and J. S. Trefil. 25 Nov 66, 33p
AFOSR-67-2033
Contract AF 49 (638)-1389
Prepared in cooperation with CERN, Geneva (Switzerland).
Availability: Published in Il Nuovo Cimento v49 Ser10 p642-72 Jun 21 1967.

Descriptors: (*Inelastic scattering, Mathematical models), (*Meson scattering, Mathematical models), (*Baryons, Inelastic scattering), Elementary particles, Nuclear cross sections, Mathematical prediction, Nuclear spins, Wave functions.
Identifiers: Quarks.

A model of inelastic meson-baryon scattering in terms of quark scattering is presented. Relations are found between cross-sections for various processes, and predictions are made for density matrix elements where particles of higher spin are produced. A number of predictions are made which do not depend on assumptions about quark dynamics other than those inherent in the quark scattering model. A comparison is made with experimental data available at the present time. (Author)
AD-657 715 Not available from CFSTI.

STRONG INITIAL- AND FINAL-STATE INTERACTIONS IN NONMESONIC HYPERNUCLEAR DECAYS AND IN PARITY-VIOLATING N+N TO N+N REACTIONS,
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 20H.
AD-657 716 Not available from CFSTI.

COUPLING BETWEEN NUCLEAR AND ELECTRONIC MOTION IN DIATOMIC MOLECULES,
Yale Univ New Haven Conn
For primary bibliographic entry see Field 20H.
AD-657 756 Not available from CFSTI.

SUBTRACTIONS IN DISPERSION RELATIONS,
University Coll London (England)
W. S. Woolcock. 20 Jun 66, 8p
AFOSR-67-2032
Grant AF-EOAR-64-62
Availability: Published in The Physical Review v153 n5 p1449-54 Jan 25 1967.

Descriptors: (*Elastic scattering, *Dispersion relations), Field theory, S-matrix, Integrals, Meson scattering, Pions, K mesons, Proton scattering, Nucleons.
Identifiers: Unitarity bounds.

Assuming the unitarity bound in the physical region on a partial-wave amplitude for an elastic scattering process, and assuming further that the amplitude satisfies a dispersion relation, it is shown that the necessity for subtractions in order to make the integral over the left-hand cut converge implies an oscillatory behavior of the discontinuity across the left-hand cut, the violence of the oscillations increasing with increasing number of subtractions. A theorem given by Sugawara and Kanazawa is provided with a rigorous proof and is applied to pion-nucleon and kaon-nucleon dispersion relations. (Author)
AD-657 814 Not available from CFSTI.

RELATIVITY FROM GALILEO TO EINSTEIN,
Politecnico Di Milano (Italy) Istituto Di Matematica
Bruno Finzi. 8 Sep 64, 19p Rept no. Pub-411
Availability: Published in Atti del Convegno sulla Relativita Generale p1-16 1965.

Descriptors: (*Relativity theory, Reviews), Transformations (Mathematics), Physics, Motion, Dynamics, Time, Gravity, Energy.

The following topics are discussed: Galilean relativity; Cartesian relativity; Classical relativistic mechanics; Lagrangian relativity; Constitutive relativity; Einstein's special relativity; The spacetime; Einstein's theory of gravitation; Consequences of the principle of general relativity; Unitary relativistic theories; The problem of energy; and, The problem of gravitational radiation.
AD-657 816 Not available from CFSTI.

WKB APPROXIMATION IN THREE DIMENSIONS,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
H. M. Van Horn, and E. E. Salpeter. 4 Nov 66, 9p
AFOSR-67-2034
Contract AF 49 (638)-1527
Availability: Published in Physical Review v157 n4 p751-8 May 20 1967.

Descriptors: (*Nuclear reactions, Wave functions), (*Wave functions, Approximation (Mathematics)), Electromagnetic waves, Particle trajectories, Selection rules, Potential scattering, Stars.

An extension to three dimensions of the WKB approximation method for the quasiclassical wave function is discussed. The extended method is applicable to problems which possess an axis of symmetry, but for which the potential need not be a separable function of the coordinates. The essential difference from the one-dimensional WKB approximation lies in the effect of the curvature of the wave fronts, which plays a central role in the three-dimensional case, and which has a direct physical interpretation. Formulas are derived for the wave function on the axis in both the allowed and the forbidden zones, as well as for the three-dimensional connection formulas. Application of the new method is made to the case of a pure Coulomb wave function and to the case of a particular nonseparable potential which is of interest in the theory of nuclear reaction rates at high density. (Author)
AD-657 883 Not available from CFSTI.

MAGNETIC MOMENTS AND PION CURRENTS IN NUCLEAR MATTER,
Stanford Univ Calif Dept of Physics
E. M. Nyman. 17 Jan 67, 18p
AFOSR-67-2051
Contract AF 49 (638)-1389
Availability: Published in Nuclear Physics B1 p535-50 1967.

Descriptors: (*Nuclear magnetic moments, Theory), (*Pions, Nuclear magnetic moments), Nucleons, Meson reactions, Invariance, Vector analysis, Interactions, Nuclear shell models.
Identifiers: Pion exchange, Gauge invariance.

The contribution from pion currents to the magnetic moment of a nucleon in nuclear matter is considered. It is shown that this effect is obtained by imposing gauge-invariance on the charge-exchange part of the one-pion exchange potential. In the absence of correlations this mechanism is known to give a 'quenching' of the moment. The change in the isovector part of the intrinsic magnetic moment is evaluated in a model which allows spin-dependent two-nucleon correlations as well as hard-core interactions. In the presence of correlations produced by the long-range tensor part of the one-pion exchange potential the moment is found to be enhanced by 0.26 nuclear magnetons. The theory is incapable of predicting isoscalar contributions to the single-particle moments. (Author)
AD-657 885 Not available from CFSTI.

ON THE ELECTROMAGNETIC STRUCTURE OF THE YUKAWA MESON. II,
Stanford Univ Calif Dept of Physics
L. I. Schiff. 22 Dec 66, 3p
AFOSR-67-2056
Contract AF 49 (638)-1389
Availability: Published in Prog. Theor. Phys. v37 n3 p635 1967.

Descriptors: (*Mesons, Electromagnetic properties), (*Potential scattering, Mesons), Elastic scattering, Interactions, Pions, Meson scattering.

In AD-630 398, a formalism was developed which permits the simple calculation of first-order Coulomb effects in the elastic scattering of strongly interacting charged particles. It was assumed in that paper that the Coulomb interaction does not extend to infinite separation of the charged particles, but is screened out in a physically meaningul way at some large separation distance. The purpose of the present note is to show that the form or range of the cutoff has no effect on the result of the calculation, to first order in the strength of the Coulomb field.
AD-657 905 Not available from CFSTI.

COMMENTS ON THE BLOOM-OPPENHEIM THEORY OF SPIN RELAXATION,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 7D.
AD-657 906 Not available from CFSTI.

DYNAMICAL THEORY OF BARYONS AND LEPTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
Behram Kursunoglu. Aug 67, 57p Rept no. CTS-HE-67-4A
Grant AF-AFOSR-1268-67
Supersedes AD-656 753.

Descriptors: (*Baryons, Field theory), (*Leptons, Field theory), Mass spectrum, Wave functions, Neutrons, Groups (Mathematics), Operators (Mathematics), Nuclear spins.
Identifiers: Symmetry (Quantum mechanics).

The paper is an attempt for a dynamical description of baryons and leptons by the same wave equation yielding different mass spectra for each one of them. The wave equation leads to the following results: (1) mass spectra for leptons and baryons (represented by orthogonal states) in the form of singlets and doublets, (2) a third neutrino along with a third neutral lepton are predicted, (3) the group SU (3,1) assumes the role of an internal symmetry group; thus pointing to the possibility of space time origin of internal symmetries. The theory is obtained from a classical non-linear (Born-Infeld type) Lagrangian depending on the field variables 'E' and 'H' and only the wave equation for spin 1/2 particles is discussed. In this approach the field itself is treated as a wave function and therefore a way is found to get rid of Born type square root. The wave equation involves, besides Dirac matrices, the 15 six-dimensional generators of the group SU (3,1). It is invariant under G = SL (2,C) x SU (3,1) x 'L' transformations, where the direct product contains the Lorentz group 'L'. (Author)
AD-657 959 HC$3.00 MF$0.65

CROSSING MATRICES FOR PARTICLES OF ARBITRARY ISOSPIN,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
Peter A. Carruthers, and Jean P. Krisch. 4 Jan 65, 14p

Contract Nonr-401 (51)
Availability: Published in Annals of Physics v33 n1 p1-14 Jun 1965.

Descriptors: (*Elementary particles, Nuclear spins), (*Nuclear spins, Matrix algebra), Interactions, Bosons, Operators (Mathematics), Invariance, Elastic scattering, Field theory.
Identifiers: C-invariance, G-invariance, Symmetry (Quantum mechanics).

An elementary and systematic discussion is given of isospin crossing symmetry for 'two-body' collisions involving particles of arbitrary isospins. Special attention is given to the question of phase relations among the states in the various crossed channels. Explicit formulas for the various crossing matrices are given in terms of Racah coefficients. Numerical forms are given for reactions of especial interest. In an appendix the behavior of the relevant fields and operators under charge conjugation and G-conjugation is described. (Author)
AD-657 960 Not available from CFSTI.

OVERLAPPING CHANNELS AND MULTICHANNEL PHENOMENA,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
R. Rajaraman, and L. Susskind. 22 Jan 65, 20p
Contract Nonr-401 (51)
Research supported in part by NSF.
Availability: Published in Il Nuovo Cimento v38 Ser10 p1201-19 Aug 1 1965.

Descriptors: (*Nuclear scattering, *Potential theory), Elementary particles, Interactions, Field theory, Wave functions, S-matrix, Hilbert space, Potential scattering.
Identifiers: Bound particles.

The problem of multichannel scattering is studied in the framework of potential theory. Some of the difficulties that arise in high-energy physics due to the overlapping of channels, are simulated. The problem is treated in such a way, that the different channels are separated and identifiable in the initial, final and intermediate states. A basis system is constructed, which serves this purpose better than the usual plane-wave states of the different channels. The procedure used also clarifies the validity of treating particles as elementary in some approximation when they may actually be composite. The relevance to strong-interaction physics is discussed. (Author)
AD-657 961 Not available from CFSTI.

THE BINDING ENERGY OF THE TRITON WITH A VELOCITY-DEPENDENT POTENTIAL.
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20H.
AD-657 962 Not available from CFSTI.

RELATIVISTIC TREATMENT OF SPIN INDEPENDENCE,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
K. J. Barnes. 5 Mar 65, 4p
Contract Nonr-401 (51)
Availability: Published in Physical Review Letters v14 n19 p798-801 May 10 1965.

Descriptors: (*Nuclear spins, *Relativity theory), Groups (Mathematics), Vector analysis, Transformations (Mathematics).
Identifiers: Symmetry (Quantum mechanics).

There have been several attempts to combine within one relativistic framework the internal symmetries of the strong interactions with their spin independence. The purpose of the letter is to present for rapid evaluation and assimilation a somewhat different treatment of the spin aspects of the problem. A brief survey of the difficulties involved in the usual approach to the problem is given in order to clarify the subsequent derivation of the new technique.
AD-657 963 Not available from CFSTI.

COHERENT STATES AND FORCED QUANTUM OSCILLATOR,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
P. Carruthers, and M. M. Nieto. 27 Jan 65, 8p
Contract Nonr-401 (51)
Research supported in part by AEC.
Availability: Published in American Journal of Physics v33 n7 p537-44 Jul 1965.

Descriptors: (*Elementary particles, Oscillation), (*Quantum mechanics, Oscillation), Field theory, Harmonic analysis, Vector analysis, Transformations, Probability, Green's function.
Identifiers: Quantum oscillators.

It is shown that the forced quantum oscillator subject to a transient classical force is easily described in terms of the 'coherent states' recently found useful in the description of light from optical masers. The natural role these states play in understanding the notions of the phase of a quantum oscillator and the transition to the classical limit is also explained. Very simple derivations of the state vectors, energy transfer, and various transition probabilities are given. (Author)
AD-657 964 Not available from CFSTI.

THRESHOLD FACTORS IN PARTIAL-WAVE DISPERSION RELATIONS.
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20H.
AD-657 965 Not available from CFSTI.

VIRTUAL PION-NUCLEON SCATTERING,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20H.
AD-657 966 Not available from CFSTI.

VIRTUAL NUCLEON EFFECTS,
Cornell Univ Ithaca N Y Lab of Nuclear Studies
For primary bibliographic entry see Field 20H.
AD-657 967 Not available from CFSTI.

ANALYTIC THEORY OF SUBCOULOMB STRIPPING. III. EXTENSION TO CASES OF ARBITRARY ANGULAR MOMENTA,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 20H.
AD-657 968 Not available from CFSTI.

CONTINUED FRACTIONS AND UPPER AND LOWER BOUNDS IN THE BRILLOUIN - WIGNER PERTURBATION SCHEME,
Uppsala Univ (Sweden) Quantum Chemistry Group
Osvaldo Goscinski. 31 Jan 67, 24p Rept no. Scientific-26
Contract AF 61 (052)-874

Descriptors: (*Atomic energy levels, Perturbation theory), (*Ground state, Perturbation theory), (*Perturbation theory, *Continued fractions), Approximation (Mathematics), Series, Operators (Mathematics), Sweden.
Identifiers: Brillouin-Wigner perturbation series.

A derivation of approximants to a continued fraction development of the energy is presented. It is based on the techniques of infinite order perturbation theory and inner projection of operators. The approximants have been introduced before; here their formal nature is clarified and conditions under which they exhibit extremal properties are presented. The oscillatory behaviour about the true eigenvalue, observed previously in the Mathieu problem, is explained. (Author)
AD-658 035 HC$3.00 MF$0.65

ASYMPTOTIC EXCHANGE COUPLING AND THE AMO METHOD,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 7D.
AD-658 036 HC$3.00 MF$0.65

THE GROUND STATE OF ATOMIC TWO-ELECTRON SYSTEMS IN THE INDEPENDENT PARTICLE MODEL,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 7D.
AD-658 037 HC$3.00 MF$0.65

TRANSITION PROBABILITIES OF THE HYDROGEN ATOM FROM NONCOMPACT DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
A. O. Barut, and Hagen Kleinert. 30 Sep 66, 5p
AFOSR-67-2091
Grant AF-AFOSR-30-65
Availability: Published in The Physical Review v156 n5 p1541-5 Apr 25 1967.

Descriptors: (*Hydrogen, Electron transitions), (*Electron transitions, Probability), Atomic spectroscopy, Quantum mechanics, Groups (Mathematics), Vector spaces, Algebras, Dipole moments, Operators (Mathematics), Wave functions.

In order to describe electromagnetic dipole transitions of the H atom within the framework of dynamical groups, an explicit irreducible representation of the Lie algebra 0 (4,2) was found on the space of bound-state wave functions. This representation remains irreducible when restricting to the subalgebra 0 (4,1). The transformation properties of the dipole operator in 0 (4,2) are specified. The description becomes particularly simple by the introduction of a one-parameter family of representations of 0 (4,2). Finally, position representations of the generators of 0 (4,2) are given. (Author)
AD-658 239 Not available from CFSTI.

CURRENT OPERATORS AND MAJORANA EQUATION FOR THE HYDROGEN ATOM FROM DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
A. O. Barut, and Hagen Kleinert. 28 Nov 66, 6p
AFOSR-67-2134
Grant AF-AFOSR-30-65
Availability: Published in The Physical Review v157 n5 p1180-3 May 25 1967.

Descriptors: (*Hydrogen, *Quantum mechanics), Wave functions, Algebras, Operators (Mathematics), Relativity theory, Momentum, Hilbert space.
Identifiers: Wave equation.

It is proved that the dipole operator in the hydrogen atom is the product of an element in the Lie algebra and of a group element of the conformal group 0 (4,2). A relativistic wave equation containing the total momentum only is set up which describes the internal structure of the system purely group theoretically and gives the correct mass spectrum. The diagonalization of this equation determines a new basis of states in which the dipole operator is simply an element of the Lie algebra. The angle of transformation to the new basis is evaluated to be theta = 2 tanh (superscript -1) (1-epsilon/n), or, theta = log (2n/epsilon), where n is the principal quantum number and epsilon is essentially the fine-structure constant. (Author)
AD-658 240 Not available from CFSTI.

TENSOR OPERATORS AND MASS FORMULA IN THE MINIMAL EXTENSION OF U3 BY CHARGE CONJUGATION,
Colorado Univ Boulder Dept of Physics
A. O. Barut, and H. Kleinert. 19 Sep 66, 4p
AFOSR-67-2113

Grant AF-AFOSR-30-65
Availability: Published in Journal of Mathematical Physics v8 n4 p685-6 Apr 1967.

Descriptors: (*Elementary particles, *Groups (Mathematics)), Transformations (Mathematics), Invariance, Tensor analysis, Operators (Mathematics), Baryons, Mesons.
Identifiers: C-invariance, Hadrons, Mass, Symmetry (Quantum mechanics).

The transformation property of the mass (or mass square) M is specified in the extended group. The most general mass formula, M = Mo + a (alpha) (I (I + 1)-1/4 (Y sq)-K (alpha))+ (b1) (alpha)NY + (b2) (alpha) (Q2)Y, is derived where a (alpha), bi (alpha), K (alpha) are constants depending on a charge-even set alpha, specified in the text, and Q2 is the second invariant operator of SU3. (Author)
AD-658 241 Not available from CFSTI.

CALCULATION OF TRANSITION PROBABILITIES FROM NONCOMPACT DYNAMICAL GROUPS,
Colorado Univ Boulder Dept of Physics
A. O. Barut. 30 Sep 66, 5p
AFOSR-67-2110
Grant AF-AFOSR-30-65
Availability: Published in The Physical Review v156 n5 p1538-40 Apr 25 1967.

Descriptors: (*Elementary particles, Groups (Mathematics)), (*Nuclear energy levels, Transformations), Interactions, Operators (Mathematics), Hydrogen, Electron transitions, S-matrix, Algebras.
Identifiers: Hadrons, Symmetry (Quantum mechanics).

External electromagnetic interactions are introduced into the formalism of noncompact dynamical groups describing all states of a quantum-mechanical system. Complete reduced matrix elements can be evaluated if the hadron levels are approximated as rotational and 'vibrational' levels. The relation of the method to the S matrix and the algebra of currents is discussed. (Author)
AD-658 242 Not available from CFSTI.

MASS-SPIN RELATION IN A LANGRANGIAN MODEL,
Institute for Advanced Study Princeton N J
H. Bacry, and J. Nuyts. 23 Dec 66, 4p
AFOSR-67-2100
Grant AF-AFOSR-42-65
Availability: Published in The Physical Review v157 n5 p1471-2 May 25 1967.

Descriptors: (*Elementary particles, Mathematical models), (*Nuclear spins, Integration), Groups (Mathematics), Wave functions, Transformations (Mathematics), Vector spaces.
Identifiers: Mass.

It is shown that in Lagrangian models based on homogeneous spaces of the Poincare group a mass-spin relation of the form (m sq.) = a + bs can be derived in a natural way. (Author)
AD-658 252 Not available from CFSTI.

ON THE INTERACTION PICTURE,
Princeton Univ N J Palmer Physical Lab
Marcel Guenin. 4 Mar 66, 13p
Research supported in part by AFOSR.
Availability: Published in Commun. Math. Phys. v3 p120-32 1966.

Descriptors: (*Field theory, *Quantum mechanics), Perturbation theory, Relativity theory, Operators (Mathematics), Hamiltonian, Hilbert space, Interactions, Mapping (Transformations), Rings (Mathematics), Theorems, Invariance, Time.

It is shown that the difficulties connected with Haag's theorem can be bypassed, without losing Euclidean invariance, if the time evolution is considered as being only locally unitarily implementable. A variant of the conventional interaction picture is defined, and a perturbation expansion derived which is shown to converge absolutely for a class of (non-trivial) Euclidean invariant 2-dimensional models. (Author)
AD-658 286 Not available from CFSTI.

SHIFT OF LANDAU LEVELS IN THE VALENCE BAND OF GERMANIUM IN CROSSED ELECTRIC AND MAGNETIC FIELDS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20L.
AD-658 310 Not available from CFSTI.

COMMENTS ON THE INFLUENCE OF INTERMEDIATE EXCITONS AND EXCHANGE FORCES ON THE INTERACTION IN MOLECULAR CRYSTALS: THE CRYSTAL STRUCTURE OF CHLORINE,
Chicago Univ Ill Inst for the Study of Metals
For primary bibliographic entry see Field 20B.
AD-658 352 Not available from CFSTI.

CALCULATION OF RELATIVISTIC TRANSITION PROBABILITIES AND FORM FACTORS FROM NONCOMPACT GROUPS,
Colorado Univ Boulder Dept of Physics
A. O. Barut, and Hagen Kleinert. 14 Nov 66, 7p
AFOSR-67-2148
Grant AF-AFOSR-30-65
Availability: Published in The Physical Review v156 n5 p1546-51 Apr 25 1967.

Descriptors: (*Elementary particles, *Groups (Mathematics)), Relativity theory, Transformations, Probability, Mathematical models, Algebras, Nuclear spins, Invariance.
Identifiers: Form factors, Gauge invariance, Symmetry groups.

Relativistic transition probabilities and form factors were evaluated in closed form (in terms of hypergeometric functions) for a model of fundamental particles constructed on the unitary irreducible representation space of a noncompact dynamical group. Majorana-type equations were used to project out irreducible subspaces of the Poincare' group and to specify the transformation properties of the electromagnetic current. The magnetic moment of the spin-1/2 ground state in the simplest representation is -1/2, and one obtains the observed symmetry (G sub E) (t) = ((G sub M) (t))/ mu. (Author)
AD-658 360 Not available from CFSTI.

CONVERGENCE OF PADE APPROXIMANTS FOR THE BETHE-SALPETER AMPLITUDE,
Texas A and M Univ College Station Dept of Physics
J. Nuttall. 9 Jan 67, 7p
AFOSR-67-2145
Grant AF-AFOSR-918-65
Availability: Published in The Physical Review v157 n5 p1312-6 May 25 1967.

Descriptors: (*Nuclear scattering, Phase shift), (*Elementary particles, Equations of motion), Approximation (Mathematics), Wave functions, Matrix algebra, Vector spaces, Operators (Mathematics).
Identifiers: Bethe-Salpeter equation.

Some earlier work on the Bethe-Salpeter equation (see AD-647 990) is extended to show that the sequence of (N,N) Pade approximants to tan delta-l converges to the correct result if the scattered particles are of equal mass. The proof includes a demonstration that the symmetrized kernel of the Bethe-Salpeter equation after a coordinate space Wick rotation is L sq. An interesting connection between Pade approximants and the Schwinger variational principle is given. (Author)
AD-658 361 Not available from CFSTI.

ANALYTIC CONTINUATION OF THE OFF-ENERGY-SHELL SCATTERING AMPLITUDE,
Texas A and M Univ College Station Dept of Physics
J. Nuttall. 31 May 66, 5p
AFOSR-67-2146
Grant AF-AFOSR-918-65
Availability: Published in Journal of Mathematical Physics v8 n4 p873-7 Apr 1967.

Descriptors: (*Nuclear scattering, Matrix algebra), Elementary particles, Operators (Mathematics), Interactions, Vector spaces, Complex variables, Potential scattering, Functions.
Identifiers: Analyticity, Meromorphic functions, T-matrix.

It is shown that the two-body scattering amplitude <k/T (E)/k> may be analytically continued in E through the physical cut into a region of meromorphy, provided that the potential satisfies certain requirements. The residue at a pole is a separable operator whose form agrees with previous work. The proof also demonstrates the existence of a region of meromorphy of <k/T (E)/k> as a function of seven complex variables. (Author)
AD-658 362 Not available from CFSTI.

TRUNCATIONS IN THE METHOD OF INTERMEDIATE PROBLEMS FOR LOWER BOUNDS TO EIGENVALUES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 12A.
AD-658 377 HC$3.00 MF$0.65

ERROR BOUNDS FOR EIGENVECTORS OF SELF-ADJOINT OPERATORS,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 12A.
AD-658 381 HC$3.00 MF$0.65

SUM RULES IN THE GEMINAL EXPANSION OF MANY-ELECTRON WAVEFUNCTIONS.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
R. J. Brown. Apr 67, 6p AAEC/TM382

Descriptors: *Expansion, *Many-particle theory, *Wave function, Eigenfunction, Eigenvalue, Function, Mathematics, Pair, Rule, Spin, Sum, Theory, Wave.

For abstract, see STAR 05 20.
N67-34173 HC$3.00 MF$0.65

BUCKLING AND INTEGRAL SPECTRUM MEASUREMENTS IN PU239/ BE O SUB-CRITICAL ASSEMBLIES.
Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 20.
N67-34214 HC$3.00 MF$0.65

APPLICATION OF METHODS COMMON TO ELEMENTARY PARTICLE PHYSICS AND MANY-BODY PROBLEMS FINAL REPORT, 15 NOV. 1965 - 15 MAY 1967.
Rio Grande Do Sul Univ., Porto Alegre (Brazil). Inst. of Physics.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 05 20.
N67-34540 HC$3.00 MF$0.65

PHYSICAL QUANTITIES AND NATURAL LAWS.

Grandezze Fisiche E Leggi Naturali
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
M. Ageno. 10 Apr 67, 67p ISS-67/10
in Italian. English Summary Presented At A Conf. Held in Milan, 10 Apr. 1967, Sponsored By the Min. of Public Instruction

Descriptors: *Conference, *Italy, *Physics, Definition, Law, Quantity, Structure.

For abstract, see STAR 05 20.
N67-34794 HC$3.00 MF$0.65

THE DEGENERATE VACUUM AND THE INFINITE COMPONENT WAVE EQUATION.
Nihon Univ., Tokyo (Japan). Dept. of Physics and Atomic Energy.
T. Goto. 1967, 17p NUP-A-67-9

Descriptors: *Heisenberg theory, *Poincare problem, *Wave function, Eigenvalue, Function, Hadron, Hilbert space, Lorentz, Mass, Mechanics, Model, Particle, Problem, Quantum, Symmetry, Theory, Transformation, Vacuum, Wave.

For abstract, see STAR 05 20.
N67-34919 HC$3.00 MF$0.65

HOW TO UNDERSTAND SPECIAL RELATIVITY,
Division of Research (AEC), Washington, D. C.
Arthur E. Ruark. Sep 66, 18p

Descriptors: (*Relativity theory, *Electromagnetic fields), (*Atomic clocks, *Time-interval counters), Charged particles, Mass-energy relation, Equations of motion, Gravity, Velocity.

For abstract, see NSA 21 18.
TID-23694 HC$3.00 MF$0.65

20K. Solid Mechanics

INVESTIGATION OF A METHOD FOR ATTENUATING PLANE WAVES IN BARS.
Technical rept.,
Minnesota Univ., Minneapolis. Dept. of Aeronautics and Engineering Mechanics.
R. Plunkett, C. E. Hanson, and C. Bouclier. Sep 65, 25p TR-65-3
Contract NObs-92285

Descriptors: (*Rods, Mechanical waves), (*Mechanical waves, Attenuation), Composite materials, Adhesives, Shear stresses, Beams (Structural), Viscoelasticity.

The investigation is the experimental verification of the mathematical analysis developed for attenuation of plane waves in semi-infinite composite bars. Traveling compressive waves in bars can be attenuated effectively by a composite configuration consisting of serrated septa bonded to the bar by layers of viscoelastic, dissipative adhesive. Attenuation depends on the ratio of sonic velocities of the septa and the bar frequency, relative dimensions, and the complex shear modulus of the adhesive. Configurations of septa with low effective sonic velocity and zero sonic velocity were tested on square bars and I-beams. Agreement between calculated and experimental attenuation factors is shown. Factors necessary for optimum attenuation are also discussed. (Author)
AD-472 496 HC$3.00 MF$0.65

THE RELATIONSHIP BETWEEN MOLECULAR STRUCTURE, MORPHOLOGY, AND THE MECHANICAL PROPERTIES OF MATERIALS.
Mellon Inst., Pittsburgh, Pa.
For primary bibliographic entry see Field 11I.
AD-487 484 HC$3.00 MF$0.65

CRACK THEORY AND STRESS ANALYSIS OF COMPOSITE SYSTEMS.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11D.
AD-488 381 HC$3.00 MF$0.65

EXPERIMENTAL DATA TO SUPPORT EXISTING THEORIES ON THE PHYSICAL AND MECHANICAL PROPERTIES OF COMPOSITE MATERIALS.
Monsanto Research Corp., St. Louis, Mo.
For primary bibliographic entry see Field 11D.
AD-488 386 HC$3.00 MF$0.65

ANGLE OF CONTACT FOR SMOOTH ELASTIC INCLUSIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Ben Noble, and M. Hussain. Apr 67, 27p Rept no. MRC-TSR-735
Contract DA-31-124-ARO (D)-462

Descriptors: (*Defects (Materials), Angle of attack), Elasticity, Stresses, Boundary value problems, Strain (Mechanics), Perturbation theory, Mathematical analysis.
Identifiers: Elastic constants.

This paper considers cylindrical and spherical inclusions in an infinite homogeneous isotropic elastic medium under uniform tension. For the two dimensional inclusion, solution of the biharmonic equation leads to 'dual series' relations. For the analogous axisymmetric problem involving a spherical inclusion Boussinesq potentials are used, which lead to 'dual series' relations involving Legendre functions.
AD-657 571 HC$3.00 MF$0.65

ON THE SEARCH FOR VARIATIONAL PRINCIPLES.
Minnesota Univ Minneapolis Dept of Chemical Engineering
For primary bibliographic entry see Field 20M.
AD-657 660 Not available from CFSTI.

ELECTRODYNAMICS OF MOVING MEDIA.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-657 672 Not available from CFSTI.

A TRIANGULAR EQUILIBRIUM ELEMENT WITH LINEARLY VARYING BENDING MOMENTS FOR PLATE BENDING PROBLEMS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
L. S. D. Morley. May 67, 21p Rept no. RAE-TR-67110

Descriptors: (*Structural parts, *Bending), Moments, Linear systems, Partial differential equations, Great Britain.
Identifiers: Plates (Mechanical).

Work on the finite element analysis of flat plates in bending has previously been directed towards elements which satisfy kinematic conditions between the adjacent elements. The purpose of the paper is to provide the main details of a triangular element which satisfies equilibrium conditions between the adjacent elements. (Author)
AD-657 681 HC$3.00 MF$0.65

TORSION OF A CYLINDRICAL ROD WELDED TO AN ELASTIC HALF SPACE,
Northwestern Univ Evanston Ill Dept of Civil Engineering
N. J. Freeman, and L. M. Keer. 14 Dec 66, 9p
AROD-5527:10
Contract DA-31-124-ARO (D)-369
Presented at the Applied Mechanics Conference, Pasadena, Calif., 26-28 Jun 67. Prepared in cooperation with Miami Univ., Coral Gables, Fla. Dept. of Civil Engineering.
Availability: Published in Journal of Applied Mechanics p1-6 1967, Paper 67-APM-30.

Descriptors: (*Cylindrical bodies, *Torsion), Rods, Elasticity, Integral equations, Stresses.

A solution is given for the problem of the torsion of an elastic cylinder welded to an elastic half space. The problem was formulated so as to involve coupling between dual-integral equations and Dini series. These equations were reduced to a single Fredholm integral equation of the second kind. Numerical results are given and functions found that accurately approximate the stress distribution when the cylinder is elastically stiffer in torsion than the half space. (Author)
AD-657 703 Not available from CFSTI.

SOME STRESS DISTRIBUTIONS IN AN ELASTIC PLATE DUE TO RIGID HEATED PUNCHES,
Northwestern Univ Evanston Ill
L. M. Keer, and W. S. Fu. 17 Oct 66, 19p
AROD-5527:6
Contract DA-31-124-ARO (D)-369
Availability: Published in International Journal of Engineering Science v5 p555-70 1967.

Descriptors: (*Metal plates, *Stresses), Elasticity, Broaches, Heating, Deformation, Integral equations, Boundary value problems, Thickness.

Some thermoelastic stress distributions due to the combined loading of rigid, non-symmetrical circular punches and an arbitrary steady-state temperature or heat flux are considered for a thick elastic plate. The result is shown to depend upon solutions of uncoupled Fredholm integral equations of the second kind. Approximate results are given for the case of axial symmetry when the radius of the punch is much smaller than the plate thickness. (Author)
AD-657 704 Not available from CFSTI.

STABILITY OF AN ELASTIC RING IN A RIGID CAVITY.
Revised ed.,
Northwestern Univ Evanston Ill Dept of Civil Engineering
G. Herrmann, and E. A. Zagustin. 7 Feb 67, 11p
AROD-4550:6
Grants AF-AFOSR-100-66, DA-ARO (D)-31-124-G623
Revision of manuscript submitted 6 Sep 66. Prepared in cooperation with Princeton, Univ., N. J., Dept. of Aerospace and Maintenance Sciences.
Availability: Published in Journal of Applied Mechanics p263-70 Jun 1967, Paper 67-APM-19.

Descriptors: (*Rings, Stability), Elasticity, Loading (Mechanics), Buckling (Mechanics), Deformation, Differential equations, Boundary value problems.

A thin, elastic circular ring constrained in a rigid cavity is subjected to a uniformly distributed parallel loading per unit length of the ring in its plane. Stability of equilibrium in the large (snap-through) is investigated. This nonlinear problem is simplified by considering the region of separation of the ring at buckling to be small, an assumption supported by experiments. This restriction permits the construction of simple expressions for the dependence of the load on the deformation, for the load at buckling, and for other relevant quantities at and beyond buckling. (Author)
AD-657 707 Not available from CFSTI.

FREE WAVES IN A PLATE SUPPORTED BY A SEMI-INFINITE CONTINUUM,

Northwestern Univ Evanston Ill Dept of Civil Engineering
J. D. Achenbach, and S. P. Keshava. 4 Aug 66, 11p
AROD-4550:7
Grant DA-ARO (D)-31-124-G915
Presented at the Applied Mechanics Conference, Pasadena, Calif., Jun 26-28, 1967. Prepared in cooperation with North Dakota State Univ., Fargo. Dept. of Civil Engineering.
Availability: Published in Journal of Applied Mathematics p397-404 Jun 1967.

Descriptors: (*Mechanical waves, Metal plates), Elasticity, Scattering, Propagation, Welds, Equations, Equations of motion, Supports.

Plate equations are used to determine dispersion curves for free waves in a layer and a supporting half space of different elastic properties. The approximate dispersion curves are compared with curves obtained by employing elasticity equations for the layer. For a relatively soft layer, agreement is good at small wave numbers. For a relatively stiff layer, good agreement is obtained over the whole range of wave numbers for which a free wave can exist. A comparison of the displacement distributions in plate and layer shows that the range of wave numbers for which the displacements are well matched is much smaller than the range for which good agreement in phase velocities is obtained. Finally, the dispersion curve for a plate on a Winkler foundation is compared with the corresponding curve for a plate in smooth contact with a semi-infinite continuum. (Author)
AD-657 710 Not available from CFSTI.

LONGITUDINAL SOUND VELOCITIES OF GRANULAR COMPACTS OF AMMONIUM PERCHLORATE AND POTASSIUM CHLORIDE,
Stanford Research Inst Menlo Park Calif Poulter Labs
For primary bibliographic entry see Field 19A.
AD-657 743 Not available from CFSTI.

EXPERIMENTAL INVESTIGATIONS ON THE DYNAMIC STRENGTH OF COMPOSITES,
Technion - Israel Inst of Tech Haifa Material Mechanics Lab
For primary bibliographic entry see Field 11D.
AD-657 820 HC$3.00 MF$0.65

CREEP OF CONICAL MEMBRANE SHELLS UNDER AERODYNAMIC HEATING AND LOADING,
State Univ of New York Buffalo Div of Interdisciplinary Studies and Research
F. A. Cozzarelli, and R. P. Vito. Jul 67, 43p Rept no. 18
Contract Nonr-4449 (00)

Descriptors: (*Structural shells, *Creep), (*Conical bodies, Creep), Angle of attack, Supersonic flow, Flow fields, Aerodynamic loading, Aerodynamic heating, Shear stresses, Membranes, Temperature, Adiabatic gas flow.

Expressions for the creep stresses and displacements in a conical shell at a small angle of attack to a supersonic flow field are obtained. The flow is assumed to be steady adiabatic and the cone is approximated by a membrane shell. Surface shear stresses are found to have a negligible effect on the solutions. On the other hand, temperature distributions which differ slightly from a given uniform valve result in displacements which differ significantly from those obtained using the uniform temperature. (Author)
AD-657 843 HC$3.00 MF$0.65

INTER-LAMINAR SHEAR STRESS IN SANDWICH BEAMS.
Columbia Univ New York Dept of Civil Engineering and Engineering Mechanics
For primary bibliographic entry see Field 13M.
AD-657 857 HC$3.00 MF$0.65

AN ITERATIVE SOLUTION FOR ROTATIONALLY SYMMETRIC NON-LINEAR MEMBRANE PROBLEMS,
Polytechnic Inst of Brooklyn N Y Dept of Chemistry
Martin A. Goldberg. 17 Feb 66, 13p
AFOSR-67-2057
Contract AF 49 (638)-1360
Availability: Published in Int. J. Non-Linear Mechanics v1 p169-78 1966.

Descriptors: (*Membranes, Deflection), Bodies of revolution, Iterative methods, Nonlinear systems, Boundary value problems, Numerical analysis.

An improved iterative technique for the large deflection analysis of rotationally symmetric membranes is presented. This procedure takes advantage of the complementary aspects of two previously suggested relaxed iteration procedures. The resulting method utilizes the Keller-Reiss type functional for each iterate. In analogy to a technique previously suggested by the author, the relaxation parameter is then evaluated from an auxiliary equation. The iterative procedure is employed to obtain an approximate solution for an internally pressurized shallow spherical membrane, which is held at the boundary. Numerical results obtained are in agreement with previous solutions to this problem. (Author)
AD-657 911 Not available from CFSTI.

THE SEPARATION OF MEMBRANE AND BENDING SHEARS IN SHELLS WITH TWO BIREFRINGENT COATINGS,
Brown Univ Providence R I Div of Engineering
W. Schumann, C. Mylonas, and R. Bucci. Jun 67, 83p Rept no. ARPA-E45
Contract SD-86, Grant NSF-G20259

Descriptors: (*Stresses, *Structural shells), Shear stresses, Bending, Membranes, Coatings, Birefringence, Test methods, Determination.

The directions and the differences of the principal membrane and bending stresses at a point of a shell or plate are calculated from the birefringence observed at normal incidence on two birefringent coatings, one on each face of the shell. A unique neutral surface is assumed, which is exact for identical coatings or for identical Poisson's ratios in shell and coating. Explicit formulas are obtained with the simplifying approximations of a negligible effect of the rotation of the principal directions and of a linear variation of the magnitude of the principal stress-difference over the finite coating thickness. These assumptions are strictly valid for very thin coatings, but give also reasonably good results for ordinary birefringent coatings. The validity of the derived expressions was checked experimentally in square plates subjected to anticlastic bending and membrane stress of known magnitude at various orientations. Two types of tests were performed. At first (1)* the membrane tension was applied through a series of pins in holes around the perimeter of a plate with relatively thick and optically insensitive coatings. Agreement between observed and calculated birefringence under these unfavorable conditions was reasonably good at the higher loads, but not good enough to permit an accurate inverse calculation of the stress-differences from the observed birefringence. The errors were found to be partly due to the difficulty of applying a true membrane force through pins without introducing any bending. (Author)
AD-657 936 HC$3.00 MF$0.65

TRANSIENT NON-AXISYMMETRIC WAVES IN TRANSVERSELY ISOTROPIC ELASTIC PLATES.
Technical rept.,
California Inst of Tech Pasadena Div of Engineering and Applied Science
Richard A. Scott, and Julius Miklowitz. Aug 67, 24p Rept no. TR-6
Contract Nonr-220 (57)

Descriptors: (*Mechanical waves, Propagation), Anisotropy, Cobalt, Beryl, Ice, Metal plates, Equations of motion, Elasticity, Mathematical analysis.
Identifiers: Elastic constants.

Using the equations of motion from linear elasticity, the formal solutions to a class of non-axisymmetric wave propagation problems involving a transversely isotropic plate are obtained. Inversion, on the epicentral axis and for a certain class of materials, is carried out explicitly for the particular problem of the application of a point shear load, with a 'ramp' time-dependence, to one face of the plate, and the results are analyzed numerically for several anisotropic and isotropic solids. (Author)
AD-658 097 HC$3.00 MF$0.65

A REVIEW OF THE PROBLEMS OF INELASTIC LONGITUDINAL AND TRANSVERSE IMPACT LOADS ON BEAMS, WITH BIBLIOGRAPHY,
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 13M.
AD-658 107 HC$3.00 MF$0.65

FORCED LONGITUDINAL MOTION OF AN ELASTIC FREE-FREE BAR,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
R. B. McCalley, Jr. 23 Jul 54, 42p Rept no. CF-2266
Contract NOrd-7386

Descriptors: (*Rods, Equations of motion), Elasticity, Vibration, Damping.

Equations of motion are derived and solved for an elastic free-free bar of variable mass and stiffness under the influence of an axial force distribution which varies with time. Viscous damping is assumed subject to the restriction that the damping coefficient is proportional to the mass per unit length of the bar, this restriction being necessary in order to obtain a problem which can be solved by the use of the normal modes of vibration. For the sake of convenience, the fundamental properties of the modes of vibration are derived herein as there seems to be no readily available reference which covers all the material required, especially when the properties of the bar vary along the length. other information of common knowledge has been included at various stages in the development in order to avoid the necessity of frequent reference to outside material. (Author)
AD-658 144 HC$3.00 MF$0.65

A COMPARISON OF PLASTIC LONGITUDINAL WAVE THEORIES FOR STRAIGHT RODS,
Texas Univ Austin Defense Research Lab
H. J. Plass, Jr. 2 Jun 53, 26p Rept no. DRL-327
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2009.

Descriptors: (*Rods, Mechanical waves), Theory, Stresses, Strain (Mechanics), Velocity, Impact shock, Propagation, Equations of motion, Differential equations, Plasticity, Dynamics.

A few numerical comparisons are made on the stresses, strains and velocities in a rod whose end is subjected to a sudden velocity impact. The computations made are based on three different theories: (1) the von Karman plastic wave theory, (b) the Malvern theory which considers a strain rate proportional to the dynamic stress excess over static stress, and (c) the strain-rate theory of Prandtl which predicts an exponential relationship

between strain rate and dynamic stress excess. (Author)
AD-658 148 HC$3.00 MF$0.65

ADSORPTION-INDUCED BRITTLE FRACTURE IN LIQUID METAL ENVIRONMENTS.
Annual rept.,
Martin Co Baltimore Md Research Inst for Advanced Studies
Albert R. C. Westwood, Carolyn M. Preece, and Madhusudan H. Kamdar. May 67, 100p Rept no. RIAS-TR-67-8c, I
Contract DA-18-001-AMC-1109 (X)

Descriptors: (*Embrittlement, Liquid metals), (*Fracture (Mechanics), Metals), Brittleness, Chemical bonds, Adsorption, Surface-active substances, Diffusion, Stresses, Cracks, Crack propagation, Fatigue (Mechanics), Alloys.

Solid metals can be caused to behave in a brittle manner by exposure to a variety of physical or chemical environments. Perhaps the most dramatic examples of such effects, however, result from exposure to surface active liquid metals. Specimens pre-stressed above some critical value fail virtually instantly on being wetted by an appropriate liquid metal, and 'brittle' crack propagation rates of order 100 cm per sec. have been recorded in otherwise ductile metals under such environmental conditions. Such effects are presently considered to result from adsorption-induced reductions in the cohesive strength of atomic bonds at regions of stress concentration in the solid metal, e.g. at the tips of cracks or in the vicinity of piled up groups of dislocations. This paper describes the results of a number of recent investigations on this type of liquid-metal embrittlement, and discusses the prerequisites and possible mechanisms for its occurrence. Also discussed are the effects of such variables as chemical composition of the solid and liquid metal phases, temperature, prestrain, rate of loading, etc., on severity of embrittlement, and such topics as the possible correlation between severity of embrittlement and electronegativity, the use of 'inert carrier' liquid metals, possible means of inhibiting liquid-metal embrittlement, and criteria for brittle failure. (Author)
AD-658 210 HC$3.00 MF$0.65

INFLUENCE OF REINFORCING DETAILS ON YIELD LINE PATTERN AND ULTIMATE LOAD-CARRYING OF REINFORCED CONCRETE SLABS.
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 11B.
AD-658 293 MF$0.65

RELAXATION PROPERTIES OF POLYESTER BASED ON POLYURETHANE UNDER SMALL DEFORMATIONS SUPERPOSED ON LARGE DEFORMATIONS.
Polytechnic Inst of Brooklyn N Y
T. T. Wang, and J. M. Klosner. Jul 67, 38p Rept no. PIBAL-937
Contract Nonr-839 (32)

Descriptors: (*Viscoelasticity, Relaxation time), (*Solid rocket propellants, Viscoelasticity), (*Isocyanate plastics, Viscoelasticity), (*Polyester plastics, Viscoelasticity), Deformation, Elongation, Stresses.

An investigation was carried out to determine the extensional mechanical behavior of a viscoelastic material when it is subject to an infinitestimal displacement field superposed on a finite steady deformation. Experiments were conducted on a thin strip of a polyester based polyurethane at a temperature of about 77 F. It is shown that the relaxation modulus of this material can be expressed as a product of two functions, one of which depends only upon the elongation ratio and the other only upon time. This form is applicable for basic state elongation rations 1 < or = lambda < or = 1.2 and for a period of two hours. It is noted that the separable form is highly suspect for longer time intervals. (Author)
AD-658 328 HC$3.00 MF$0.65

BURRAU'S PROBLEM OF THREE BODIES.
Yale Univ New Haven Conn Observatory
For primary bibliographic entry see Field 3C.
AD-658 357 Not available from CFSTI.

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-658 392 HC$3.00 MF$0.65

RESPONSE OF CIRCULAR CLAMPED PLATES TO SQUARE WAVE STRESS PULSES.
Stanford Univ Calif Dept of Materials Science
For primary bibliographic entry see Field 13M.
AD-658 401 HC$3.00 MF$0.65

DAMPING OF DISLOCATIONS IN LEAD SINGLE CRYSTALS.
Technical rept.,
Columbia Univ New York Inst for the Study of Fatigue and Reliability
Warren P. Mason, and Arthur Rosenberg. 14 Mar 66, 14p Rept no. TR-52
Contract Nonr-266 (91)
Availability: Published in Journal of Applied Physics v38 n4 p1929-36 Mar 15 1967.

Descriptors: (*Lead, Dislocations), (*Dislocations, Acoustic properties), Single crystals, Ultrasonic radiation, Attenuation, Drag, Internal friction, Phonons, Elasticity.

Measurements were made of the attenuation of longitudinal waves along the <110> direction in a lead single crystal over a frequency range from 30 to 150 Mc/sec and in a temperature range from 60 to 300K. The attenuation can be divided into a square-law frequency term and a term consistent with the theoretical form of dislocation attenuation at high frequencies. By determining the high-frequency asymptote of the dislocation internal friction and by assuming a reasonable dislocation density, the drag coefficient for the dislocations can be evaluated. The measurements are consistent with the sum of a phonon scattering term and a phonon viscosity term. The square-law attenuation is about twice as large as the thermoelastic loss and over a temperature range is in agreement with the sum of a thermoelastic loss plus a phonon viscosity loss. (Author)
AD-658 412 Not available from CFSTI.

THERMOMECHANICAL COUPLING BEHAVIOR OF VISCOELASTIC RODS SUBJECTED TO CYCLIC LOADING.
Technical rept.,
Stanford Univ Calif Div of Engineering Mechanics
N. C. Huang, and E. H. Lee. Jul 67, 9p Rept no. TR-11
Contract Nonr-225 (69)
Prepared in cooperation with California Univ., San Diego, La Jolla. Dept. of the Aerospace and Mechanical Engineering Sciences.
Availability: Published in Journal of Applied Mechanics p127-32 Mar 1967.

Descriptors: (*Rods, *Viscoelasticity), Vibration, Boundary value problems, Iterative methods, Stresses, Temperature, Equations of motion.

The problem of longitudinal oscillation of a viscoelastic rod of finite length including the effect of thermomechanical coupling was studied. The material is assumed to be thermorheologically simple. The almost steady oscillation superposed on a slowly varying temperature distribution permits representation as a boundary-value problem which is solved numerically by iterative procedures. Calculations are made for different stress levels and frequencies. It is found that the temperature increases considerably after a length of time of vibration although the stress level is low. A steady state of temperature can be reached if the temperature at one end of the rod is fixed and a radiation boundary condition is prescribed at the other end. (Author)
AD-658 414 Not available from CFSTI.

FAILURE ANALYSES AND PROPERTIES OF SAFETY ROD GUIDE TUBES FROM THE HWCTR.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 17.
DP-1077 HC$3.00 MF$0.65

ONE-DIMENSIONAL ELASTIC-PLASTIC CALCULATIONS FOR ALUMINUM,
Los Alamos Scientific Lab., N. Mex.
Charles L. Mader. 14 Feb 67, 23p
Contract W-7405-eng-36

Descriptors: (*Aluminum, Elasticity), (*Plasticity, Performance (Engineering)), One-dimensional flow.

For abstract, see NSA 21 17.
LA-3678 HC$3.00 MF$0.65

CREEP DEFORMATION AND BUCKLING OF A CIRCULAR CYLINDRICAL SHELL UNDER AXIAL COMPRESSION.
Aeronautical Research Inst. of Sweden, Stockholm.
A. Samuelson. 1967, 27p FFA-R-108

Descriptors: *Axial compression, *Circular shell, *Creep buckling, *Cylindrical shell, *Deformation, Aluminum, Axial, Buckling, Circular, Compression, Creep, Cylinder, Deflection, Distribution, Elastic, Membrane, Shell, Strain, Stress, Theory, Time.

For abstract, see STAR 05 20.
N67-34085 HC$3.00 MF$0.65

CREEP DEFORMATION AND BUCKLING OF A COLUMN WITH AN ARBITRARY CROSS SECTION.
Aeronautical Research Inst. of Sweden, Stockholm.
A. Samuelson. 1967, 31p FFA-R-107

Descriptors: *Creep buckling, *Elastic bar, *Numerical analysis, Arbitrary, Bending, Cross section, Deflection, Deformation, Difference, Distribution, Finite, Method, Stress.

For abstract, see STAR 05 20.
N67-34100 HC$3.00 MF$0.65

MECHANICAL CHARACTERISTICS OF AUSTENITIC STEELS QUARTERLY REPORT, APR. - JUN. 1966.
Compagnie des Ateliers Et Forges de La Loire, Paris (France). Departement des Recherches.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-34140 HC$3.00 MF$0.65

BUCKLING AND INTEGRAL SPECTRUM MEASUREMENTS IN PU239/ BE O SUB-CRITICAL ASSEMBLIES.
Atomic Energy Commission Research Establish-

ment, Lucas Heights (Australia).
P. Duerden. Jun 67, 46p AAEC/E177

Descriptors: *Beryllium oxide, *Buckling, *Fission, *Plutonium 239, *Reactor material, Assembly, Beryllium, Flux, Fuel, Integral, Lattice, Material, Measurement, Oxide, Rate, Reactor, Spectrum, Stack, Subcritical.

For abstract, see STAR 05 20.
N67-34214 HC$3.00 MF$0.65

A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SHEAR LAG IN STIFFENED SHELLS AND THE STRESS ANALYSIS OF CONE FRUSTUMS AND SEGMENTS FINAL REPORT.
Alabama Univ., University. Bureau of Engineering Research.
May 67, 412p NASA-CR-87445
Contract NAS8-20164

Descriptors: *Buckling, *Cone, *Shell stability, *Stiff structure, Analysis, Asymptote, Distribution, Effect, Frustum, Lag, Panel, Segment, Shear, Shell, Stability, Stiffness, Stress, Structure.

For abstract, see STAR 05 20.
N67-34217 HC$3.00 MF$0.65

RIGID SOLUTION OF THE ENERGY INDEPENDENT NEUTRON TRANSPORT EQUATION FOR A THIN IMBEDDED LAYER.
Strenge Loesung Der Energieunabhaengigen Neutronentransportgleich
ung Fuer Eine Duenne Eingebettete Schicht
Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Forschungsreaktoren.
G. Meister. May 67, 48p JUL-484-RE
in German

Descriptors: *Neutron distribution, *Transport equation, Density, Distribution, Eigenfunction, Energy, Equation, Flow, Flux, Layer, Neutron, Property, Solution, Spatial, Thin, Transport.

For abstract, see STAR 05 20.
N67-34254 HC$3.00 MF$0.65

ON APPLYING FINITE ELEMENTS TO PANEL FLUTTER.
National Research Council of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 20.
N67-34429 HC$3.00 MF$0.65

THE ONE-VELOCITY NEUTRON FLUX DISTRIBUTION IN A CYLINDRICAL CELL.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
S. A. Kushneriuk. May 67, 37p AECL-2709, CRT-1258

Descriptors: *Integral equation, *Neutron flux, *Velocity distribution, Asymptote, Cell, Cylinder, Diffusion, Distribution, Equation, Flux, Infinite, Integral, Isotropic, Lattice, Medium, Neutron, One, Rod, Scattering, Source, Theory, Velocity.

For abstract, see STAR 05 20.
N67-34498 HC$3.00 MF$0.65

SHELLS OF POSITIVE GAUSSIAN CURVATURE UNDER POSTCRITICAL DEFORMATIONS. PART II - LOSS OF STABILITY.
Strogo Vypuklye Obolochki Pri Zakriticheskikh Deformatsiyakh. Part Ii - Poterya Ustoichiousti Obolochek
Israel Program for Scientific Translations, Ltd., Jerusalem.
A. V. Pogorelov. 1967, 70p NASA-TT-F-444, TT-67-51376
Published for Nasa and Nsf

Descriptors: *Curved surface, *Gaussian distribution, *Loading, *Shell stability, Critical, Curve, Deformation, Distribution, External, Loss, Mechanics, Positive, Pressure, Rotation, Shell, Stability, Surface, Theory.

For abstract, see STAR 05 20.
N67-34547 HC$3.00 MF$0.65

BUCKLING OF A PRESSURIZED TOROIDAL RING UNDER UNIFORM EXTERNAL LOADING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
G. E. Weeks. Aug 67, 24p NASA-TN-D-4124

Descriptors: *Buckling, *Loading, *Toroidal shell, Cross section, Deformation, Direction, Equation, Extension, Finite, Geometry, Internal, Magnitude, Parameter, Plane, Pressure, Pressurization, Radius, Ring, Shear, Shell, Stiffness, Toroid, Transverse.

For abstract, see STAR 05 20.
N67-34657 HC$3.00 MF$0.65

ADDITIVE PROPERTY OF MODAL DENSITY FOR A COMPOSITE STRUCTURE PROGRESS REPORT.
North Carolina State Coll., Raleigh. Dept. of Mechanical and Aerospace Engineering.
F. D. Hart. Aug 67, 20p NASA-CR-66453, PR-3
Contract NGR-34-002-035

Descriptors: *Composite structure, *Natural frequency, *Structural vibration, Additive, Analysis, Beam, Composite, Density, Energy, Frequency, Load, Method, Mode, Natural, Property, Statistical, Structure, Vibration.

For abstract, see STAR 05 20.
N67-34690 HC$3.00 MF$0.65

THERMAL BENDING PLUS TWIST OF A THIN-WALLED CYLINDER OF OPEN SECTION WITH APPLICATION TO GRAVITY GRADIENT BOOMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. P. Frisch. Aug 67, 64p NASA-TN-D-4069

Descriptors: *Boom, *Cylinder, *Gravity, *Thermal buckling, *Thin wall, Analysis, Bending, Boundary, Buckling, Coordinate, Deflection, Digital, Distribution, Equation, Equilibrium, Field, Gradient, Open, Position, Problem, Section, Shape, Shear, Solution, Stress, Sun, System, Temperature, Thermal, Thin, Torque, Torsion, Value, Wall.

For abstract, see STAR 05 20.
N67-34807 HC$3.00 MF$0.65

THE RESIDUAL STATIC STRENGTH OF A BOLTED JOINT CRACKED IN FATIGUE.
Royal Aircraft Establishment, Farnborough (England).
G. R. Eynon, and W. T. Kirkby. Apr 66, 21p RAE-TR-66111

Descriptors: *Fatigue test, *Joint, *Load test, *Static testing, *Tensile strength, Alloy, Aluminum, Bar, Bolt, Crack, Fatigue, Fracture, Load, Residual, Static, Strain, Strength, Tensile, Test.

For abstract, see STAR 05 20.
N67-34909 HC$3.00 MF$0.65

ANALYSIS OF LATTICE EXPERIMENTS WITH LIQUID MODERATOR, USING A MODIFIED TWO-GROUP THEORY.
Analisis de Experiencias de Reticulados Con Moderador Liquido, Empleando Una Teoria A Dos Grupos Modificada
Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
R. Solanilla. 1967, 65p CNEA-184
in Spanish, English Summary Submitted for Publication

Descriptors: *Group theory, *Moderator, *Water, Analysis, Diffusion, Fuel, Group, Heavy, Heavy water, Lattice, Light, Reactor, Theory, Two, Uranium.

For abstract, see STAR 05 20.
N67-35016 HC$3.00 MF$0.65

FATIGUE OF METALS - WHERE IT STANDS TODAY.
Aeronautical Research Labs., Melbourne (Australia).
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-35135 HC$3.00 MF$0.65

SELF-SHIELDED CROSS SECTIONS FOR THE MAIN FERTILE AND FISSILE NUCLEI.
Atomic Energy Establishment, Trombay (India).
G. A. Desai, and R. S. Singh. 1966, 23p AEET-272

Descriptors: *Plutonium 239, *Reactor, *Thorium, *Uranium, Analysis, Coefficient, Cross section, Doppler effect, Fertility, Fissile, Multigroup, Neutron, Nucleus, Reaction, Reactivity, Resonance, Shield, Temperature, Value.

For abstract, see STAR 05 20.
N67-35157 HC$3.00 MF$0.65

ENGINEERING APPROACH TO MULTIAXIAL PLASTICITY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 18.
ORNL-4138 HC$3.00 MF$0.65

INVESTIGATION OF SHEAR BEHAVIOR OF PRESTRESSED CONCRETE BRIDGE GIRDERS.
Tulane Univ., New Orleans, La. Dept. of Civil Engineering.
For primary bibliographic entry see Field 11B.
PB-175 745 HC$3.00 MF$0.65

A STUDY OF COHESION, FRICTIONAL RESISTANCE, AND INTERLOCKING OF PARTICLES AS BASIC STRENGTH COMPONENTS OF ASPHALTIC CONCRETE.
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 11B.
PB-175 761 HC$3.00 MF$0.65

THE PHENOMENON OF CHANGE IN BUCKLE PATTERN IN ELASTIC STRUCTURES.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 13M.
PB-175 912 HC$3.00 MF$0.65

A PHENOMENOLOGICAL THEORY FOR THE TRANSIENT CREEP OF METALS AT ELEVATED TEMPERATURES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Elbridge Z. Stowell. 18 Jul 58, 18p NASA-TR-R-44
N62-70468

Descriptors: (*Creep, Theory), (*Metals, Creep), High-temperature research, Aluminum, Tensile properties, Aluminum alloys, Iron, Lead.

In this theory, a metal consisting of two phases, each with its own elasticity and viscosity, will exhibit transient creep after application of a constant stress. A comparison of the transient creep curves resulting from this theory with experimental data on four different metals shows that the entire family of creep curves for any one metal are given by the theory using a single set of constants appropriate to that metal. (Author)
PB-175 917 HC$3.00 MF$0.65

A STUDY OF CREEP IN LIGHTWEIGHT AND CONVENTIONAL CONCRETES.
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
For primary bibliographic entry see Field 11B.
PB-175 941 HC$3.00 MF$0.65

ANALYSIS OF LAYERED SYSTEMS. INTERIM REPORT ON PHASE II. STRESSES AND DISPLACEMENTS IN NONLINEAR SOIL MEDIA,
Virginia Highway Research Council, Charlottesville.
For primary bibliographic entry see Field 8M.
PB-175 943 HC$3.00 MF$0.65

THERMALLY GENERATED STRESS WAVES IN A DISPERSIVE ELASTIC ROD,
California Univ., Livermore. Lawrence Radiation Lab.
C. Mark Percival. 28 Apr 67, 102p
Contract W-7405-eng-48

Descriptors: (*Thermal stresses, Propagation), (*Rods, Elasticity), Lasers, Ruby, Quartz, Calibration, Piezoelectric transducers.

For abstract, see NSA 21 17.
UCRL-50252 HC$3.00 MF$0.65

20L. Solid-State Physics

STRUCTURE OF ALPHA GeTe,
Chicago Univ Ill Inst for the Study of Metals
For primary bibliographic entry see Field 20B.
AD-657 544 Not available from CFSTI.

IRRADIATION OF KCl CRYSTALS CONTAINING KSH.
University of Western Ontario London Dept of Chemistry
For primary bibliographic entry see Field 7E.
AD-657 604 HC$3.00 MF$0.65

THEORY OF THE EXCITONIC INSULATOR IN THE PRESENCE OF NORMAL IMPURITIES,
California Univ San Diego La Jolla Dept of Physics
Johannes Zittartz. 21 Jun 67, 30p Rept no. TR-46
Contract Nonr-2216 (11)

Descriptors: (*Excitons, *Band theory of solids), (*Semiconductors, Band theory of solids), Transition temperature, Carriers (Semiconductors), Strontium, Metalloids, Electrical properties, Mathematical analysis.
Identifiers: Semiconductor impurities.

Recently several papers have discussed the possibility of a new kind of insulating phase in semimetals or semiconductors with small band gap. This phase can be described as a condensate of electron-hole pairs (excitons) due to an effective interaction between valence and conduction electrons. This paper extends the analysis of the excitonic phase in the semimetallic region in the presence of randomly distributed normal (i.e. nonmagnetic) impurities. It is shown that the impurities have a pair-breaking effect similar to the case of magnetic impurities in superconductors. The Abrikosov-Gorkov theory developed for the latter case is applied with minor modifications to the excitonic phase. It is shown that beyond a critical impurity concentration the excitonic phase cannot exist. Changes in the transition temperature and in the order parameter are calculated as well as the density of states. It is found that in a region close to the critical concentration the excitation spectrum of the system has no energy gap. (Author)
AD-657 610 HC$3.00 MF$0.65

ELECTRON SPIN POLARIZATION DUE TO A MAGNETIC IMPURITY,
Maryland Univ College Park Dept of Physics and Astronomy
Martin S. Fullenbaum, and David S. Falk. 14 Nov 66, 7p
AFOSR-67-1965
Grant AF-AFOSR-735-65
Availability: Published in The Physical Review v157 n2 p452-6 May 10 1967.

Descriptors: (*Crystal lattice defects, Magnetic moments), Magnetic materials, Impurities, Electrons, Spin, Plasma medium, Green's function, Atomic orbitals, Perturbation theory, Polarization, Magnetic properties, Interactions.
Identifiers: Magnetic susceptibility.

The Green's function for an electron gas interacting with a localized moment through the s-d contact interaction, in the presence of a magnetic field, is found to second order in perturbation theory. The moment is polarized, giving an electron spin polarization as a function of distance from the impurity. It is shown that spin-flip terms in second order give a correction to the Ruderman-Kittel-Yosida spin polarization. This correction is proportional to ln (k sub F)r times an oscillatory function of (k sub F)r at large distances from the moment. For completeness, the susceptibility of the system is computed. (Author)
AD-657 658 Not available from CFSTI.

LOW-FIELD DE HAAS-VAN ALPHEN STUDY OF THE FERMI SURFACE OF ALUMINUM,
Case Inst of Tech Cleveland Ohio Dept of Physics
C. O. Larson, and W. L. Gordon. 26 Sep 66, 15p
AFOSR-67-1963
Grants AF-AFOSR-536-66, AF-AFOSR-536-64
Availability: Published in The Physical Review v156 n3 p703-15 Apr 15 1967.

Descriptors: (*Aluminum, *Band theory of solids), Atomic energy levels, Cyclotron resonance phenomena.
Identifiers: Fermi surfaces, de Haas-van Alphen effect.

The third-zone Fermi surface of aluminum was studied using the low-field de Haas-van Alphen effect. The observed de Haas-van Alphen periods have been assigned to the principal portions of the third-zone surface according to the model proposed by Ashcroft. Several cyclotron masses have been determined and are found to be consistent with cyclotron resonance results, where comparison is possible. de Haas-van Alphen cyclotron masses have been compared with the band-structure masses calculated by Ashcroft. This comparison indicates that, within the uncertainties in observed and calculated masses, there is a 30 to 50% enhancement of the band-structure masses over the third-zone surface, in agreement with the calculations of Ashcroft and Wilkins. (Author)
AD-657 663 Not available from CFSTI.

RARE EARTH COMPOUNDS,
Durham Univ (England) Dept of Physics
K. N. R. Taylor, M. I. Darby, and D. R. Thompson. Aug 67, 6p
AFOSR-67-1994
Grant AF-EOAR-75-63
Availability: Published in Proprietes Thermodynamiques Physiques et Structurales des Derives Semi-Metalliques - CRNS p357-60 1967.

Descriptors: (*Rare earth compounds, Transition temperature), (*Crystal lattices, Rare earth compounds), Magnetic properties, Ferromagnetism, Antiferromagnetism, Transformations, Interactions, Great Britain.
Identifiers: Curie point.

Attempts were made to correlate the Curie temperatures of several rare earth compounds with the lattice spacing. It is shown that consideration of the first and second nearest neighbours only, in the exchange is insufficient if an interaction of the Ruderman-Kittel-Yosida type is to apply. (Author)
AD-657 686 Not available from CFSTI.

LATTICE DYNAMICS OF WURTZITE: CdS.
Revised ed.,
New York Univ N Y Dept of Physics
Michel A. Nusimovici, and Joseph L. Birman. 26 Oct 66, 17p
AROD-4054:17
Contract AF 33 (615)-1746, Grant DA-ARO (D)-124-G424
Revision of manuscript submitted 8 Jul 66.
Availability: Published in The Physical Review v156 n3 p925-38 Apr 15 1967.

Descriptors: (*Cadmium sulfides, *Phonons), (*Crystal lattices, Cadmium sulfides), Mechanical waves, Propagation, Frequency, Raman spectroscopy, Infrared spectroscopy, Valence, Crystal structure, Symmetry (Crystallography).

A mixed valence-Coulomb force field was constructed and used to calculate phonon frequencies for waves propagating in three principal directions in CdS wurtzite, and in two directions of a CdS sphalerite structure. Using calculated phonon frequencies, the observed two-phonon Raman spectrum in CdS wurtzite is interpreted. Phonon symmetries and energy shifts predicted by the model were verified by infrared and Raman experiments. The qualitative and quantitative importance of both valence and Coulomb forces in materials like CdS is demonstrated. This has implications for interpreting phonon studied in mixed crystals with wurtzite, and with sphalerite structure. The valence-Coulomb force-field model may have general applicability to other crystals, for which a shell model cannot be applied. (Author)
AD-657 714 Not available from CFSTI.

TUNNELING CURRENTS VIA AU LEVELS IN Ge ESAKI DIODES,
Illinois Univ Urbana Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-657 745 Not available from CFSTI.

THE GaAs-InSb GRADED-GAP HETEROJUNCTION.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Everett D. Hinkley, and Robert H. Rediker. 15 Aug 67, 53p Rept no. TN-1967-49
ESD-TR-67-468
Contract AF 19 (628)-5167

Descriptors: (*Semiconductors, Physical properties), Photoconductivity, Single crystals, Gallium arsenides, Indium antimonides, Manufacturing methods, Band theory of solids, Crystal lattice defects, Crystal lattices, Carriers (Semiconductors), Electric currents, Capacitance, Diffusion, Tunneling (Electronics).
Identifiers: Heterojunctions, Semiconductor impurities.

The interface-alloy technique has been used to produce heterojunctions between GaAs and InSb. X-ray and Kossel line patterns show that, despite the relatively large 14% lattice mismatch between the semiconductors, these heterojunctions are single-crystal. Photocurrent and current-voltage measurements are explained by a model for the heterojunction band structure in which the salient feature is a region of the order of 60 A long which has a linearly-graded energy gap joining the GaAs to the InSb. The photocurrent occurs via hot carriers generated in the graded-gap region which traverse this region (with a mean free path of approximately 20 A) to the heterojunction barrier maximum. The results of the capacitance-voltage measurements are consistent with the current-voltage and photocurrent measurements evaluated in terms of the graded-gap heterojunction model.
AD-657 777 HC$3.00 MF$0.65

PARAMAGNETIC RESONANCE IN RARE EARTH METALS.
Final scientific rept. 1 Jun 66-31 May 67,
Sheffield Univ (England) Dept of Physics
R. S. Tebble, A. M. Harris, Brian Johnson, and D. W. Temple. 26 Jun 67, 22p
AFOSR-67-1961
Grant AF-EOAR-60-65

Descriptors: (*Rare earth elements, *Paramagnetic resonance), (*Gadolinium, Paramagnetic resonance), (*Metal films, Paramagnetic resonance), Instrumentation, Magnetic properties, Cryogenics, Iron, Nickel, Vapor plating, Crystal structure, Electron microscopy, Ferromagnetism, Single crystals, Great Britain.
Identifiers: Spin wave resonance.

Apparatus for the observation of spin wave resonance (SWR) in rare earth metal films in magnetic fields of 27 Koe and at liquid nitrogen temperatures was developed. Although SWR was observed in evaporated iron and nickel films none has been observed in gadolinium. This may be due to oxidations during preparation, magnetostrictive strains in the crystal dispersion in the magnetization, or a combination of these. The problems involved in the preparation of these films were defined and a programme of producing thin gadolinium films and examining them by transmission electron microscopy was commenced. The use of Lorentz electron microscope techniques allow of the simultaneous examination of magnetic and crystallographic structure. (Author)
AD-657 790 HC$3.00 MF$0.65

SUPERPARAMAGNETIC BEHAVIOR OF SOLIDS AT LIQUID HELIUM TEMPERATURES.
Final scientific rept. 1 Jan 63-31 Dec 66,
Technion - Israel Inst of Tech Haifa Dept of Physics
A. A. Hirsch. 28 Feb 67, 78p
AFOSR-67-2002
Grant AF-EOAR-71-63

Descriptors: (*Ferromagnetic materials, Powders), (*Powders, Cryogenics), Israel, Paramagnetic materials, Solids, Magnetism, Relaxation time, Films, Magnetic properties, Particles, Nickel, Metal films, Resistance (Electrical), Interactions.

It is shown in this work that the individual particles of fine powders of ferromagnetic materials represent aggregates of subdomain volumes which are magnetically coupled by means of magnetostatic, magnetoelastic and exchange forces. These forces are responsible for the establishment of an inhomogeneous magnetization within these particles. The magnetization process within the subdomains is assumed to be caused by growth of magnetic nuclei and by thermal fluctuations which are cvaracteristic of the superparamagnetic state. The mechanism of this process is responsible for the slow magnetization rel xation phenomena observed in fine powders. As found these phenomena become very pronounced at liquid helium temperatures. The magnetization process in granular multilayer films behaves in a way which is similar to that of fine powders when the thicknesses of the individual layers are very small so that superparamagnetic properties can be exhibited. Cold rolled ferromagnetic metal with large roll reduction in thickness show a similar magnetic behavior because of their laminated structure. The inhomogeneous magnetization within the different laminations of the multiple films can be investigated using the magnetoresistance effect as an experimental tool. (Author)
AD-657 804 HC$3.00 MF$0.65

MAGNETORESISTANCE AND HALL EFFECT IN p-TYPE GERMANIUM.
Technical rept.,
Colorado Univ Boulder Dept of Physics and Astrophysics
William F. Love, and Jean W. Gallagher. Aug 67, 37p Rept no. TR-4
Contract Nonr-1147 (12)

Descriptors: (*Germanium, Magnetic properties), Hall effect, Resistance (Electrical), Measurement, Semiconductors.

The transverse magnetoresistance and Hall effect between 16 and 70 K were measured in p-type germanium in fields up to 165 kgauss. The zero-field resistance at 77 K was approximately 2.4 ohm-cm. Samples oriented with H in the (111) direction, I random; H in the (001) direction, I in the (110) direction; H in the (110) direction, I in the (001) direction; and H in the (110) direction, and I in the (110) direction were investigated. The magnetoresistance was found to be approximately linear in H with little dependence on orientation. The Hall coefficient was independent of H above 30 K but increased with H at lower temperatures due to 'magnetic freeze-out' of carriers. (Author)
AD-657 851 HC$3.00 MF$0.65

ULTRASONIC VELOCITY AND DISPERSION IN LIQUID HELIUM II FROM 0.15 TO 1.8K,
Massachusetts Inst of Tech Cambridge National Magnet Lab
C. E. Chase, and W. M. Whitney. 11 Jan 67, 17p
AFOSR-67-2071
Contracts F44620-67-C-0047, SD-90
Prepared in cooperation with California Inst. of Tech., Pasadena. Jet Propulsion Lab.
Availability: Published in Physical Review v158 n1 p200-14 Jun 5 1967. Research supported in part by NSF and NASA.

Descriptors: (*Liquefied gases, *Ultrasonic radiation), (*Helium, Cryogenics), Velocity, Scattering, Wave transmission, Temperature.

From the measurement of changes in the delay experienced by an ultrasonic pulse traversing a fixed path, the temperature dependence of the velocity of sound in liquid helium under its saturated vapor pressure has been determined from 0.15 to 1.8K at the frequencies 1.00, 3.91, and 11.9 Mc/sec. A phase-comparison technique made it possible to resolve velocity changes amounting to a few mm/sec. With increasing temperature, the velocity u sub 1 increases above its asymptotic limit u sub 10 at 0K, passes through a maximum near 0.7K, and decreases rapidly at higher temperatures. The velocity difference over any temperature interval that extends from below 0.2 to above 1.1K is independent of frequency, but within the temperature range indicated u sub 1 increases with frequency and the position of its maximum shifts to higher temperatures. At (1.00, 3.91, 11.9) Mc/sec the maximum velocity lies (5.7,14) cm/sec above u sub 10 and occurs at (0.65, 0.70, 0.72)K. The dispersion is greatest in the neighborhood of 0.9K, where the attenuation coefficient goes through a maximu. Within experimental error, the theory of Khalatnikov and Chernikova accounts for the separation between the velocity-versus-temperature curves at the three frequencies. Combination of the velocity changes measured in these experiments with values of the absolute vel city obtained by other workers above 1K yields u sub 10 = 238.3 sub 0 plus or minus 0.1 sub 3 m/sec. (Author)
AD-657 903 Not available from CFSTI.

MICROWAVE EMISSION FROM n-TYPE INDIUM ANTIMONIDE AT 4.2 AND 77K,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
G. Bekefi, A. Bers, and S. T. J. Brueck. 10 Apr 67, 4p
Contract DA-28-043-AMC-02536, Grant NSF-GK-1165
Availability: Published in Physical Review Letters v19 n1 p24-7 Jul 3 1967.

Descriptors: (*Indium antimonides, Microwaves), (*Microwaves, Indium antimonides), Semiconductors, Emissivity, Noise, Electric fields, Magnetic fields, Transport properties, Phonons.

Indium antimonide emits microwave noise when it is subjected simultaneously to parallel dc electric and magnetic fields whose values exceed certain thresholds. Comparison of the emission characteristics at 77K with those at 4.2K shows two major differences: (a) The threshold magnetic field at 4.2K is approximately half that at 77K. (b) With increasing magnetic field the emission at 4.2K is comprised of a background continuum upon which are superposed equally spaced resonant spikes; at 77K the background continuum only is observed. (Author)
AD-657 928 Not available from CFSTI.

THE SEMICONDUCTIVE PROPERTIES OF LIPIDS AND THEIR RELATION TO THE ELECTRICAL CONDUCTIVITY OF LIPID BILAYERS.
Michigan State Univ East Lansing Dept of Biophysics
For primary bibliographic entry see Field 6A.
AD-657 954 HC$3.00 MF$0.65

TETRAHEDRAL-SITE COPPER IN CHALCOGENIDE SPINELS.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. B. Goodenough. 23 Aug 67, 10p Rept no. TN-1967-42
ESD-TR-67-481
Contract AF 19 (628)-5167

Descriptors: (*Spinels, Crystal structure), (*Copper compounds, Spinels), Ferromagnetic materials, Sulfides, Selenides, Tellurides, Chromium compounds, Crystal lattices, Magnetic properties, Electrical conductance, Atomic orbitals, Band theory of solids.

The ferromagnetism and metallic conductivity of the compounds Cu (Cr2)X4, where X = S, Se, or Te, have been interpreted in terms of collective 'd' electrons of t2g symmetry from Cu (2+) ions and localized d electrons of t2g symmetry at Cr (3+) ions. Lotgering and van Stapele have studied the compounds CuCrRhSe4, CuCrTiS4, and M1-xCu (Cr2)Se4, where M = Zn, Cd, or Hg. They have asserted that their results disprove this hypothesis and strongly support the existence of Cr (4+) ions in the presence of Cu (+) ions. It is shown that these assertions are incorrect. (Author)
AD-658 027 HC$3.00 MF$0.65

APPLICATION OF THE AUGER PROCESS TO THE STUDY OF GASEOUS ADSORPTION ON TUNGSTEN,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 7D.
AD-658 072 HC$3.00 MF$0.65

HALL COEFFICIENT AND TRANSVERSE MAGNETORESISTANCE IN HgTe AT 4.2K AND 77K.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Theodore C. Harman, Jurgen M. Honig, and Philip H. Trent. 25 Aug 67, 31p Rept no. TN-1967-43
ESD-TR-67-484
Contract AF 19 (628)-5167

Descriptors: (*Mercury compounds, *Band theory of solids), (*Tellurides, Band theory of solids), (*Hall effect, Mercury compounds), Magnetic properties, Semiconductors, Carriers (Semiconductors), Transport properties, Single crystals, Resistance (Electrical).
Identifiers: Mercury telluride, Magnetoresistive effect.

A band structure model is proposed which is consistent with magneto-Hall and magneto-resistance data obtained for various samples of HgTe at 4.2K. Using an optimization routine it was ascertained that the data could be fitted on the basis of a three-carrier model involving two sets of electrons and one set of holes. Under special crystal growth conditions the electron Hall mobility at 4.2K of HgTe exceeded 640,000 sq cm/v-sec. (Author)
AD-658 089 HC$3.00 MF$0.65

FINITE AMPLITUDE INSTABILITIES IN WEAKLY IONIZED GASES AND SOLIDS,
Boeing Scientific Research Labs Seattle Wash Plasma Physics Lab
For primary bibliographic entry see Field 20I.
AD-658 160 HC$3.00 MF$0.65

BRILLOUIN SCATTERING EXPERIMENTS IN THE FERROELECTRIC CRYSTAL TRIGLYCINE SULFATE.
Technical rept.,
Johns Hopkins Univ Baltimore Md Dept of Physics
Robert W. Gammon, and Herman Z. Cummins. 1 Sep 67, 185p Rept no. TR-2
Contract DA-31-124-ARO (D)-400, ARPA Order-675

Descriptors: (*Ferroelectric crystals, Scattering), (*Glycines, Optical properties), Sulfates, Acoustic properties, Free energy, Transition temperature, Polarization, Phase studies, Potential theory, Symmetry (Crystallography), Refractive index.
Identifiers: Brillouin scattering, Curie point, Pockel's effect, Triglycine sulfate.

Brillouin scattering measurements were made on triglycine sulfate near its Curie temperature (TC). Temperature and field dependent single relaxation time acoustic velocity dispersion was found in confirmation of the predictions of a simple free energy expansion theory of the dynamics of the strain and polarization fluctuations near TC. Additional experimental results obtained for triglycine sulfate include measurement of the acoustic mode velocities for all three modes for various directions in the (010) plane, measurement of the longitudinal velocity along the ferroelectric axis, a measurement of a reference absolute cross section for Brillouin scattering in triglycine sulfate, and determination of some of the Pockels coefficients from the Brillouin component intensity in various directions. (Author)
AD-658 167 HC$3.00 MF$0.65

STUDY OF CROSSED-FIELD AMPLIFIERS.
California Univ Berkeley Electronics Research Lab
For primary bibliographic entry see Field 9E.
AD-658 200 HC$3.00 MF$0.65

TRANSPORT PHENOMENA IN THE SIMPLE METALS.
Doctoral thesis,
Maryland Univ College Park Dept of Physics and Astronomy
R. E. Prange, and A. Sachs. 1 Dec 66, 13p
AFOSR-67-2131
Grant AF-AFOSR-735-65
Availability: Published in The Physical Review v158 n3 p672-82 Jun 15 1967.

Descriptors: (*Metals, Transport properties), (*Electrons, Interactions), (*Phonons, Interactions), Potential scattering, Differential equations, Band theory of solids, Crystal lattices.

The low-excitation-energy phenomena characteristic of the simple metals is discussed. The model used takes into account both the electron-phonon and electron-electron interactions. The result obtained is an extended form of Landau's Fermi-liquid theory. The parameters of the theory are related to the underlying interactions, and the relationships corresponding to the relation of the effective mass with the 'scattering function' discovered by Landau are developed. The theory is used to classify the renormalization effects in the interacting electron-phonon model of the metal. The results are valid when excitation energies no greater in magnitude than the Debye energy are involved, with the exception that the usual differential form of the Landau-Boltzmann transport equation does not hold if time variations of frequency comparable to the Debye frequency are considered. (Author)
AD-658 272 Not available from CFSTI.

THEORY OF POINT DEFECT ANNEALING IN METALS,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
For primary bibliographic entry see Field 20B.
AD-658 291 Not available from CFSTI.

SHIFT OF LANDAU LEVELS IN THE VALENCE BAND OF GERMANIUM IN CROSSED ELECTRIC AND MAGNETIC FIELDS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
Q. H. F. Vrehen, W. Zawadzki, and M. Reine. 1 Feb 67, 10p
AFOSR-67-2132
Contract F44620-67-C-0047
Availability: Published in Physical Review v158 n3 p702-8 Jun 15 1967.

Descriptors: (*Germanium, *Band theory of solids), Carriers (Semiconductors), Electrons, Electric fields, Magnetic fields, Valence, Absorption spectrum, Mathematical analysis.

Optical-absorption and Voigt-effect measurements in germanium have been performed in crossed electric and magnetic fields for photon energies just below the direct gap. The electric fields were taken between 2.8 x 10 to the 4th power and 4.7 x 10 to the 4th power V/cm, the magnetic fields were chosen between 62.5 and 96.5 kOe. Three transitions were observed, two of which are allowed for E = 0 (delta n = 0), whereas the third is forbidden for E = 0, but is induced by the electric field (delta n = -1). From the experimental data the energies of three light-hole levels are deduced, under the assumption that the energies of the electron levels can be calculated according to the theory for a simple parabolic band in cross fields. A calculation is developed for the energies of the light-hole levels in cross fields for the range of high (E/H) values where a perturbation treatment is not sufficient. This calculation is within the framework of the effective-mass approximation and neglects the electric-field-induced coupling between light- and heavy-hole states. The theory shows that for higher (E/H) values the electric-field-induced shifts of the light-hole levels are comparable to those that would have been found in simple bands, and that the electric field removes the quantum effects in the energies of the light-hole levels. The theory is in satisfactory agreement with the experimental results.
AD-658 310 Not available from CFSTI.

RADIATION EFFECTS IN THERMOELECTRICS. 2. PERMANENT AND QUASI-PERMANENT EFFECTS OF PILE BOMBARDMENT ON SEVERAL COMPOUND SEMICONDUCTORS,
Naval Radiological Defense Lab San Francisco Calif
J. W. Winslow. 18 Jul 67, 212p Rept no. USNRDL-TR-67-83
See also AD-291 235.

Descriptors: (*Semiconductors, *Radiation damage), (*Thermoelectricity, Radiation damage), Neutron reactions, Dose rate, Lead compounds, Germanium compounds, Bismuth compounds, Selenides, Tellurides, Cobalt compounds, Solid solutions, Germanium alloys, Bismuth alloys, Arsenic alloys, Silicon alloys, Tellurium alloys, Seebeck effect.

The effects of reactor bombardment on the thermoelectric properties of several compound semiconductors have been observed experimentally for exposure doses up to 2.3 x 10 to the 19th power fast (E > 1 MeV) neutrons/sq cm. Results are reported for the following materials: PbTe; Ge.95Bi.05T3; Ag2Se; n- and p-types of a Ge-Si alloy whose exact composition is classified; (GeTe)90% (AgSbTe2)10%; CoSi; n- and p-types of commercial grade Bi2Te3; and single-crystal, stoichiometric Bi2Te3. Properties measured were Seebeck coefficient, electrical resistivity, and thermal diffusivity. The effects observed ranged from an apparently simple case of change in majority charge carrier concentration due to transmutations, to rather complicated cases in which the behavior of the variables was strongly influenced, both for the better and for the worse, by post-irradiation, thermally activated processes, e.g., annealing. In some cases, no effects at all were found. Some indications that substantial improvements in the thermoelectric figure of merit for the Ge-Si alloys may be possible through appropriate sequences of irradiation and post-irradiation thermal treatment, were seen.
AD-658 326 HC$3.00 MF$0.65

ZERO-POINT PHONON CONTRIBUTION TO THE HYPERFINE COUPLING OF S-STATE IONS.
Revised ed.,
California Univ Los Angeles Dept of Physics
R. Orbach, and E. Simanek. 29 Mar 67, 4p
Contract Nonr-233 (88)
Research supported in part by NSF. Revision of manuscript submitted 14 Nov 66.
Availability: Published in The Physical Review v158 n2 p310-3 Jun 10 1967.

Descriptors: (*Crystal lattice defects, Interactions), (*Manganese, Hyperfine structure), (*Phonons, Interactions), Magnesium oxides, Strontium compounds, Oxides, Impurities, Molecular orbitals, Crystal lattices.
Identifiers: Strontium oxide.

The temperature-independent phonon zero-point motion is shown to decrease the hyperfine coupling constant A for Mn (2+) ions in a cubic environment. A spherical approximation is made for the phonon vibrational modes appropriate to a rocksalt structure, enabling the inclusion of contributions from both the acoustic and optical branches. Numerical calculations are performed for vibrational parameters appropriate to both MgO and SrO. The temperature-dependent part of the decrease in A due to thermal phonon excitation is also evaluated for both hosts. Comparing the two calculations, the temperature can be determined at which the decrease in A due to thermal excitations equals the decrease due to zero-point

excitations. These temperatures are 383K for MgO and 133K for SrO. Use is then made of the observed decrease in A with temperature to find the magnitude of the zero-point reduction in both hosts. (Author)
AD-658 413 Not available from CFSTI.

AN EXPERIMENTAL INVESTIGATION OF RADIATION EFFECTS IN SEMICONDUCTORS SEMIANNUAL STATUS REPORT, 1 JAN. - 30 JUN. 1967.
Illinois Univ., Urbana. Coordinated Science Lab.
W. D. Compton. 30 Jun 67, 89p NASA-CR-87410
Grant NSG-22862

Descriptors: *Radiation effect, *Recombination, *Semiconductor, *Silicon, Annealing, Boron, Diode, Doping, Effect, Gamma, Lifetime, N type, P type, Photoconductivity, Radiation, Tunneling.

For abstract, see STAR 05 20.
N67-34022 HC$3.00 MF$0.65

FUNDAMENTAL STUDIES OF THE METALLURGICAL, ELECTRICAL, AND OPTICAL PROPERTIES OF GALLIUM PHOSPHIDE QUARTERLY PROGRESS REPORT, 1 APR. - 30 JUN. 1967.
Stanford Univ., Calif. Solid-state Electronics Labs.
G. L. Pearson. 30 Jun 67, 17p NASA-CR-87418
Grant NSG-555

Descriptors: *Gallium phosphide, *Photoconductivity, Crystal, Deposition, Diffusion, Donor, Electric, Electric property, Gallium, Growth, Optical, Phosphide, Photon, Pressure, Property, Solubility, Vapor.

For abstract, see STAR 05 20.
N67-34023 HC$3.00 MF$0.65

S-D EXCHANGE INTERACTION IN THE SUPERCONDUCTOR.
Tokyo Univ. (Japan). Dept. of Physics.
T. Matsuura, Y. Nagaoka, and T. Soda. 1967, 33p TUEP-67-9

Descriptors: *Energy exchange, *Perturbation theory, *Scattering, *Superconductor, Atom, Bound, Energy, Exchange, Impurity, Interaction, Magnetic, Metal, Particle, Perturbation, Quasiparticle, Series, Spin, State, Theory.

For abstract, see STAR 05 20.
N67-34137 HC$3.00 MF$0.65

PHYSICS OF VIBRONIC TRANSITIONS IN THE SPECTRA OF RARE EARTH IONS IN CRYSTALS FINAL SCIENTIFIC REPORT, 15 NOV. 1965 - 15 NOV. 1966.
Hebrew Univ., Jerusalem (Israel). Dept. of Physics.
W. Low, and S. Yatsiv. 25 Feb 67, 44p AFCRL-67-0278, AD-653634
Contract AF-EOAR-66-21

Descriptors: *Calcium fluoride, *Crystal, *Gadolinium, *Hydrogen ion, *Spectroscopy, *Thermodynamic property, Absorption, Defect, Earth, Electron, Element, Hydrogen, Impurity, Infrared, Interaction, Ion, Lattice, Negative, Property, Rare, Spectrum, Thermodynamic, Transition, Ultraviolet, Visible.

For abstract, see STAR 05 20.
N67-34248 HC$3.00 MF$0.65

SPECTROPHOTOMETRIC ANALYSIS OF THIN ANTIMONY/ARSENIC ALLOY FILMS.
United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
L. Tomlinson. May 67, 9p AERE-M-1886

Descriptors: *Antimony, *Arsenic, *Metal film, *Spectrophotometry, *Thin film, Alloy, Color, Comparison, Dissolution, Film, Metal, Procedure, Radiochemistry, Stability, Thin.

For abstract, see STAR 05 20.
N67-34310 HC$3.00 MF$0.65

ACOUSTOELECTRIC OSCILLATIONS, CURRENT SATURATION AND ELECTRON DRIFT MOBILITY IN CADMIUM SULPHIDE CRYSTALS.
Norwegian Defence Research Establishment, Kjeller.
A. Rannestad. 18 Nov 66, 27p AFCRL-67-0285, SR-1
Contracts AF 61/052/-484, AF 61/052/-958

Descriptors: *Cadmium sulfide, *Electric current, *Electroacoustic wave, *Electron mobility, *Piezoelectric crystal, Acoustic, Amplification, Cadmium, Crystal, Current, Drift, Electric, Electroacoustics, Electron, Mobility, Oscillation, Photoconductivity, Piezoelectricity, Saturation, Scattering, Semiconductor, Sulfide, Temperature, Trapping, Wave.

For abstract, see STAR 05 20.
N67-34356 HC$3.00 MF$0.65

OPTICAL PHONON SCATTERING IN THE QUANTUM LIMIT.
Royal Ins . of Tech., Stockholm (Sweden). Microwave Dept.
B. Magnusson, and P. Weissglas. 17 Mar 67, 12p SR-18, RADC-TR-67-371
Contract AF 61/052/-895

Descriptors: *Magnetic field, *Momentum energy, *Polarization characteristics, Band, Calculation, Differential, Electric, Electron, Energy, Equation, Field, Limit, Magnetic, Momentum, Optical, Phonon, Polar, Polarization, Property, Quantum, Relaxation, Scattering, Semiconductor, Theory.

For abstract, see STAR 05 20.
N67-34402 HC$3.00 MF$0.65

SOME INVESTIGATIONS ON GERMANIUM AND SILICON SURFACES.
Technische Hogeschool, Eindhoven (Netherlands).
A. H. Boonstra. 27 Jun 67, 118p

Descriptors: *Germanium, *Silicon, *Single crystal, *Surface property, Adsorption, Charge, Clean, Conductivity, Crystal, Effect, Field, Gas, Measurement, Nitride, Property, Single, Space, State, Surface.

For abstract, see STAR 05 20.
N67-34491 HC$3.00 MF$0.65

THE SURFACE PROPERTIES OF OXIDIZED SILICON.
Technische Hogeschool, Eindhoven (Netherlands).
E. Kooi. 16 Jun 67, 151p

Descriptors: *Heat treatment, *Radiation effect, *Silicon oxide, *Surface property, Charge, Coating, Defect, Diffusion, Distribution, Effect, Film, Heat, Hydrogen, Impurity, Ionizing, Masking, Oxide, Phosphorus, Property, Radiation, Semiconductor, Silicon, Sodium, Surface, Transistor, Treatment.

For abstract, see STAR 05 20.
N67-34495 HC$3.00 MF$0.65

PHOTOCHEMICAL INTERPRETATION OF INACTIVITY PHENOMENA IN CADMIUM SULFIDE.
Technische Hogeschool, Eindhoven (Netherlands).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 05 20.
N67-34599 HC$3.00 MF$0.65

TRANSITION METAL IMPURITIES IN SEMICONDUCTORS.
Stanford Univ., Calif. Solid-state Electronics Lab.
J. W. Allen, and G. L. Pearson. Jun 67, 70p NASA-CR-87816, SEL-67-060
Grant NSG-555

Descriptors: *Crystal, *Impurity, *Semiconductor, *Transition element, Absorption, Electron, Field, Kinetics, Luminescence, Metal, Optical, Phosphor, Spectrum, Theory, Transition.

For abstract, see STAR 05 20.
N67-34740 HC$3.00 MF$0.65

DIFFUSION AND SURFACE REACTIONS OF SINGLET EXCITONS IN ANTHRACENE.
Technische Hogeschool, Eindhoven (Netherlands).
B. J. Mulder. 1967, 43p

Descriptors: *Anthracene, *Aromatic compound, *Diffusion effect, *Exciton, *Single crystal, *Surface reaction, Absorption, Aqueous, Aromatics, Calculation, Cell, Compound, Crystal, Crystallography, Diffusion, Doping, Dye, Effect, Electrode, Feasibility, Fluorescence, Hydrocarbon, Length, Model, Photoconductivity, Reaction, Sandwich, Single, Solution, Surface.

For abstract, see STAR 05 20.
N67-34836 HC$3.00 MF$0.65

AN EXPERIMENT FOR DETERMINATION OF THE DAMAGE FUNCTION GAMMA/ T/ IN GOLD.
Ein Versuch Zur Bestimmung Der Verlagerungs-Funktion Gamma/T/in Gold
Kernforschungsanlage, Juelich (West Germany). Institut Fuer Reaktorwerkstoffe.
W. Schilling, and J. Voelkl. Mar 67, 51p JUL-464-RW
in German, English Summary

Descriptors: *Gamma function, *Gold, *Radiation effect, Atom, Damage, Defect, Effect, Electric, Energy, Foil, Frenkel pair, Function, Gamma, Low temperature, Nonuniform, Particle, Proton, Radiation, Resistance, Scattering.

For abstract, see STAR 05 20.
N67-35271 HC$3.00 MF$0.65

THE THEORY OF DIFFUSION IN STRAINED SYSTEMS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Louis A. Girifalco, and Hubert H. Grimes. 2 Sep 58, 24p NASA-TR-R-38

Descriptors: (*Diffusion, *Solid state physics), Theory, Strain (Mechanics), Tensile properties, Compressive properties, Creep, Stresses, Plasticity, Rupture.

A general theory of solid-state diffusion in strained systems is developed on a molecular-kinetic basis. The theory predicts that for simple strains the diffusion coefficient is an exponential function of the lattice parameter and that the rate of change of the diffusion coefficient with strain is linearly related to the interatomic forces. It has also been shown that for plastic flow the diffusion coefficient is a linear function of strain rate. All these conclusions

are confirmed by the data available in the literature. (Author)
PB-175 910 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

20M. Thermodynamics

THE PRESSURE DROP ACROSS CURVED INTERFACES.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 7D.
AD-657 580 HC$3.00 MF$0.65

SURFACE ENERGY BALANCE OF BARE SOIL AS INFLUENCED BY WETTING AND DRYING.
Agricultural Research Service Tempe Ariz Water Conservation Lab
For primary bibliographic entry see Field 8M.
AD-657 634 HC$3.00 MF$0.65

FIRST-ORDER PHASE TRANSITIONS IN SPIN-ONE ISING SYSTEMS,
Yeshiva Univ New York Belfer Graduate School of Science
R. B. Griffiths. 9 May 66, 4p
AFOSR-67-2035
Grant AF-AFOSR-508-66
Research supported in part by NSF.
Availability: Published in Physica v33 p689-90 1967.

Descriptors: (*Phase studies, *Hamiltonian), Transition temperature, Approximation (Mathematics), Spin, Mathematical models, Free energy, Magnetic properties.
Identifiers: Ising model.

Recently, Capel has shown that in the molecular field approximation the spin-one Ising system described by a particular Hamiltonian has a first-order phase transition. In this note it is shown that a modified form of the Hamiltonian will produce a first-order transition without any approximations. (Author)
AD-657 651 Not available from CFSTI.

THE CALCULATION OF MODEL STELLAR ATMOSPHERES,
Princeton Univ N J Observatory
For primary bibliographic entry see Field 3B.
AD-657 653 Not available from CFSTI.

ON THE SEARCH FOR VARIATIONAL PRINCIPLES.
Revised ed.,
Minnesota Univ Minneapolis Dept of Chemical Engineering
B. A. Finlayson, and L. E. Scriven. 18 Oct 66, 25p
AFOSR-67-1964
Grant AF-AFOSR-219-63
Revision of manuscript submitted 9 Aug 66.
Availability: Published in Int. J. Heat Mass Transfer v10 p799-821 1967.

Descriptors: (*Optimization, Mathematics), (*Mechanics, Optimization), (*Thermodynamics, Optimization), Dynamics, Approximation (Mathematics), Particles, Operators (Mathematics), Conduction (Heat transfer), Boundary value problems, Temperature, Calculus of variations, Physics.
Identifiers: Variational theory.

Several attempts to formulate variational principles for non-self-adjoint and nonlinear systems are examined. The variational formulations are found to lack the advantages of genuine variational principles, chiefly because the variational integral is not stationary or because no variational integral exists. The corresponding variational methods of approximation are shown to be equivalent to the more straight-forward Galerkin method or another closely related version of method of weighted residuals. The methods due to Rosen (restricted variations), Glansdorff and Prigogine (local potential), and Biot (Lagrangian thermodynamics) are treated. It is concluded that there is no practical need for variational formulations of the sort examined. (Author)
AD-657 660 Not available from CFSTI.

DETERMINATION OF THE THERMAL ACCOMMODATION COEFFICIENTS OF GASES ON CLEAN SURFACES AT TEMPERATURES ABOVE 300K BY THE TEMPERATURE JUMP METHOD,
Missouri Univ Columbia Dept of Chemistry
D. Vincent Roach, and Lloyd B. Thomas. 17 Aug 67, 12p
AFOSR-67-1922
Grant AF-AFOSR-94-63
Availability: Published in Rarefied Gas Dynamics Symposium (5th) v1 p163-72 1967.

Descriptors: (*Helium group gases, Thermal properties), (*Tungsten, Thermal properties), Superaerodynamics, Heat transfer, Kinetic theory, Helium, Neon, Argon, Surfaces, Thermal conductivity.

Temperature jump methods were used to determine the accommodation coefficients (A.C.) of helium, neon, and argon on clean tungsten surfaces at gas temperatures considerably above 300K. The experimental determined A.C. dependence on gas temperature is compared with lattice theory predictions. (Author)
AD-657 661 Not available from CFSTI.

VELOCITY DEPENDENCE OF TOTAL CROSS SECTION FOR THERMAL ENERGY ATOM-MOLECULE SCATTERING,
General Dynamics/Convair San Diego Calif Space Science Lab
For primary bibliographic entry see Field 20H.
AD-657 702 Not available from CFSTI.

THE HEAT OF FORMATION OF BORON TRIFLUORIDE BY DIRECT COMBINATION OF THE ELEMENTS,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 731 Not available from CFSTI.

MEASURED RELATIVE ENTHALPY OF ANHYDROUS CRYSTALLINE ALUMINUM TRIFLUORIDE, AlF3, FROM 273 TO 1173K AND DERIVED THERMODYNAMIC PROPERTIES FROM 273 TO 1600K,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 732 Not available from CFSTI.

THE HEATS OF COMBUSTION OF POLYTETRAFLUOROETHYLENE (TEFLON) AND GRAPHITE IN ELEMENTAL FLUORINE,
National Bureau of Standards Washington D C Ins for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 733 Not available from CFSTI.

RADIATION FROM NONISOTHERMAL GASES,
Southwest Center for Advanced Studies Dallas Tex
Gilbert N. Plass. 18 Jun 67, 23p Rept no. Scientific-3
AFCRL-67-0464
Contract AF 19 (628)-5039

Descriptors: (*Gases, *Thermal radiation), Absorption spectrum, Line spectrum, Flames, Molecular properties, Temperature, Distribution.

General expressions are derived for the radiance of a nonisothermal gas in terms of the equivalent width of the relevant spectral lines. Any appropriate expression for the equivalent width may be used in these equations taken either from the theory of band models or from exact calculations which use molecular constants. A general expression for the radiance is derived which is based on the Curtis-Godson approximation; this is compared with exact calculations. Radiance calculations for four different temperature distributions are given in order to illustrate the method. (Author)
AD-657 800 HC$3.00 MF$0.65

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. I. THEORY FOR VARIABLE PROPERTY FLOW,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-657 919 Not available from CFSTI.

HEAT TRANSFER FROM CIRCULAR CYLINDERS AT LOW REYNOLDS NUMBERS. II. EXPERIMENTAL RESULTS AND COMPARISON WITH THEORY,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-657 920 Not available from CFSTI.

DETERMINATION OF TEMPERATURE DISTRIBUTION IN WOOD WITH VARIABLE SURFACE TEMPERATURE BY NUMERICAL INTEGRATION OF DUHAMEL'S INTEGRAL.
Research note,
Forest Products Lab Madison Wis
Fred Rattner, and E. L. Schaffer. Jul 67, 15p Rept no. FPL-0169

Descriptors: (*Wood, Surface temperatures), (*Surface temperatures, Integrals), Computer programs, Theorems, Fires, Thermal properties, Degradation, Graphics.
Identifiers: FORTRAN.

A numerical method is developed to determine the temperature distribution in homogeneous semi-infinite or thick-walled solids when the temperature of one surface varies with time. A computer program is given in 'FORTRAN' language for the determination of the temperature distribution in the solid and illustratively applied to wood that is subjected to standard fire conditions (ASTM E-119) at the surface. The results are presented graphically. It appears that the method developed can be applied with confidence to surface time-temperature functions of other materials. (Author)
AD-657 953 HC$3.00 MF$0.65

ON CONCAVE BODIES IN FREE MOLECULAR FLOW,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 20D.
AD-658 013 HC$3.00 MF$0.65

LOW TEMPERATURE THERMAL EXPANSION OF WURTZITE-PHASES OF IIB-VIB COMPOUNDS. PART I. THERMAL EXPANSION OF ZnS, WURTZITE FROM 2 DEGREES TO 317K.
Final rept. 5 Jan 65-31 Jul 66,
Ohio State Univ Research Foundation Columbus
R. R. Reeber, and G. W. Powell. Jun 67, 23p
ARL-67-0123-Pt-1
Contract AF 33 (615)-2270

Descriptors: (*Thermal expansion, *Zinc sulfides), Crystal lattices, X-ray diffraction cameras, Cadmium sulfides, Vibration, Cryogenics, Semiconductors, Tables, Least squares method.

Thermal expansion measurements of the wurtzite phase of CdS (5) and the zincblende phase of ZnS (6) have indicated that negative values of molar volume coefficients of expansion are to be expected from open structures, especially those like ZnS which have low shear moduli. In this experiment the thermal expansion of the wurtzite phase of ZnS was measured using a back reflection Debye-Scherrer X-ray camera. The minimum value of the molar volume was found to occur at 60 degrees plus or minus 5K. Experimental results indicate that retrograde behavior is found both parallel and perpendicular to the c-axis in ZnS. The total decrease in molar volume from 300K to the minimum volume obtained was approximately 0.3%. (Author)

AD-658 026 HC$3.00 MF$0.65

ON GREY ABSORPTION COEFFICIENTS IN RADIATIVE TRANSFER.
Scientific interim rept.,
Martin Co Baltimore Md Research Inst for Advanced Studies
S. C. Traugott. Aug 67, 65p Rept no. RIAS-TR-67-9c
AFOSR-67-2044
Contract AF 49 (638)-1726

Descriptors: (*Heat transfer, Gases), Thermal radiation, Temperature, Continuum mechanics, Absorption, Thermodynamics, Thermal conductivity.

The radiative heat flux and several frequency averaged absorption coefficients were calculated for a plane-parallel radiating gas slab, for a variety of absorption spectra. Both constant temperature and constant temperature gradient are considered. None of the assumptions concerning these coefficients of several recent non-grey models turn out to be verifiable, except at best under more restrictive conditions. With constant temperature, the heat flux is to a good approximation the same function of a single optical depth as in a grey gas. With variable temperature a radiative transfer equation with a common coefficient for both emission and absorption terms becomes meaningless, a separate coefficient should be used for the absorption term. (Author)

AD-658 209 HC$3.00 MF$0.65

NONGRAY RADIATIVE TRANSFER EFFECTS ON THE RADIATING STAGNATION REGION SHOCK LAYER AND STAGNATION POINT HEAT TRANSFER,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20D.
AD-658 321 HC$3.00 MF$0.65

MEASUREMENTS OF HYPERSONIC TURBULENT HEAT TRANSFER ON A HIGHLY COOLED CONE,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20D.
AD-658 322 HC$3.00 MF$0.65

EXISTENCE OF ENTROPY AS A CONSEQUENCE OF ASYMPTOTIC STABILITY,
Melbourne Univ (Australia)
Bernard D. Coleman, and Victor J. Mizel. 26 Jan 67, 31p
AFOSR-67-2154
Grant AF-AFOSR-728-66
Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh, Pa.
Availability: Published in Archive for Rational Mechanics and Analysis v25 n4 p243-70 1967.

Descriptors: (*Entropy, Stability), (*Thermodynamics, Stability), Dynamics, Energy, Temperature, Heat transfer, Mathematical analysis, Theorems.
Identifiers: Lyapunov functions.

For a class of physical systems whose temporal evolution is governed by ordinary differential equations, the consequences of an assumption of asymptotic stability for equilibrium states in isolation remarkably resemble various forms of the second law of thermodynamics. Here we apply a known converse to Lyapunov's stability theorem to motivate both Gibbs' theory of thermostatics and the use of the Clausius-Duhem inequality for systems which are out of equilibrium and exchanging heat with their surroundings. We also discuss conditions under which the entropy of a system can be expressed as a sum of the entropies of its material points. (Author)

AD-658 354 Not available from CFSTI.

EQUIPRESENCE AND CONSTITUTIVE EQUATIONS FOR RIGID HEAT CONDUCTORS,
Mellon Inst Pittsburgh Pa
Bernard D. Coleman, and Morton E. Gurtin. 13 Aug 66, 13p
AFOSR-67-2163
Grant AF-AFOSR-728-66
Prepared in cooperation with Carnegie Inst. of Tech., Pittsburg, Pa.
Availability: Published in Journal of Applied Mathematics and Physics v18 n2 p199-208 1967.

Descriptors: (*Conduction (Heat transfer), Mathematical analysis), Entropy, Free energy, Continuum mechanics, Thermodynamics, Thermal conductivity, Temperature, Theorems.
Identifiers: Euclidean space.

This article discusses recent applications of the principle of equipresence. The emphasis is on constitutive equations for the heat flux vector. We find the limitations which the Clausius-Duhem inequality places on the response functions of materials for which the free-energy and the entropy are influenced by not only the history of the temperature but also the history of the temperature gradient.

AD-658 355 Not available from CFSTI.

HEAT TRANSFER IN ROTATED ARCS WITH WATER-COOLED ELECTRODES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 13A.
AD-658 373 HC$3.00 MF$0.65

HEAT TRANSFER FROM A SPHERE TO LIQUID SODIUM DURING FORCED CONVECTION,
Argonne National Lab., Ill.
Larry C. Witte. Jan 67, 99p
Contract W-31-109-eng-38

Descriptors: (*Heat transfer, Spheres), (*Sodium, Liquid metals), Convection (Heat transfer).

For abstract, see NSA 21 17.
ANL-7296 HC$3.00 MF$0.65

A REVIEW AND DISCUSSION OF LITERATURE CONCERNING TRANSIENT HEAT TRANSFER AND STEAM FORMATION,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
Robert P. Morgan. Mar 67, 70p
Contract AT (10-1)-205

Descriptors: (*Heat transfer, *Steam), (*Reactor fuel elements, *Reactor coolants), Computer programs.

For abstract, see NSA 21 17.
IDO-17226 HC$3.00 MF$0.65

BOSE-EINSTEIN CONDENSATION AND SUPERCONDUCTIVITY,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20C.
For abstract, see NSA 21 18.
LA-3600 HC$3.00 MF$0.65

EFFECT OF SELF-INDUCED THERMAL ACOUSTIC OSCILLATIONS ON HEAT TRANSFER TO HYDROGEN,
Los Alamos Scientific Lab., N. Mex.
Rodney S. Thurston. Dec 66, 36p
Contract W-7405-eng-36

Descriptors: (*Heat transfer, Hydrogen), (*Convection (Heat transfer), Oscillation), Gases, Enthalpy.

For abstract, see NSA 21 17.
LA-3616 HC$3.00 MF$0.65

ORBITAL HEAT PIPE EXPERIMENT,
Los Alamos Scientific Lab., N. Mex.
J. E. Deverall, E. W. Salmi, and R. J. Knapp. 5 Jun 67, 14p
Contract W-7405-eng-36

Descriptors: (*Heat transfer, *Thermal conductivity), (*Vapor pressure, Instrumentation), Resistance thermometers, Calibration.

For abstract, see NSA 21 17.
LA-3714 HC$3.00 MF$0.65

BOILING HEAT TRANSFER WITH ELECTRICAL FIELD (EHD),
Final rept.,
Atlantic Research Corp., Alexandria, Va.
Robert L. Durfee, Charles R. Nichols, and Jack M. Spurlock. Feb 66, 194p
Contract AT (30-1)-2404

Descriptors: (*Heat transfer, *Boiling), (*Electric fields, Voltage), Reactor coolants, Film boiling, Burnthrough, Reactor feasibility studies.

For abstract, see NSA 21 18.
NYO-2404-76 HC$3.00 MF$0.65

PRESENTATION AND TESTING OF THE MATHEMATICAL MODEL FOR THE OPERATING DATA OF A STEAM-HEATED BOILER TUBE CLUSTER HEAT EXCHANGER.
Technische Hochschule Munchen (West Germany).
For primary bibliographic entry see Field 13A.
For abstract, see STAR 05 20.
N67-34404 HC$3.00 MF$0.65

HANDBOOK OF OPTICAL PROPERTIES FOR THERMAL CONTROL SURFACES, VOLUME III FINAL REPORT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
R. Breuch. 25 Jun 67, 81p NASA-CR-87484, LMSC-A847882, VOL. III
Contract NAS8-20353

Descriptors: *Control surface, *Handbook, *Temperature control, *Thermal insulation, *Thermophysical property, Absorber, Coating, Control, Data, Design, Flat, High performance, Information, Insulation, Material, Optical, Property, Reflector, Solar, Spacecraft, Surface, Temperature, Thermal, Thermophysical.

For abstract, see STAR 05 20.
N67-34625 HC$3.00 MF$0.65

INFRA-RED RADIATION METHOD OF DETERMINING THERMAL DIFFUSIVITY, HEAT CAPACITY AND THERMAL CONDUCTIVITY OF SOLID MATERIALS.
National Aerospace Lab., Tokyo (Japan).
K. Ogawa. 1967, 15p NAL-TR-128
in Japanese, English Summary

Descriptors: *Conductivity, *Heat capacity, *Infrared radiation, *Solids, *Thermal diffusion, Capacity, Diffusion, Glass, Heat, Infrared, Plastics, Radiation, Steel, Temperature, Thermal, Wood.

For abstract, see STAR 05 20.
N67-34640 HC$3.00 MF$0.65

RADIAL TIME FUNCTIONS AND OTHER SOLUTIONS OF THE RADIAL HEAT EQUATION.
Case Inst. of Tech., Cleveland, Ohio. Dept. of Mathematics.
R. A. Kowalski. Jun 67, 92p NASA-CR-87809
Grant NSG-544

Descriptors: *Heat equation, *Radial distribution, *Thermal expansion, *Time function, Distribution, Equation, Expansion, Finite, Function, Heat, Infinite, Integral, Interval, Radial, Representation, Solution, Theorem, Thermal, Time.

For abstract, see STAR 05 20.
N67-34703 HC$3.00 MF$0.65

EFFECTS OF FLUID PROPERTIES AND GRAVITY LEVEL ON BOILING IN THE DISCRETE BUBBLE REGION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. C. Aydelott, and T. H. Cochran. Aug 67, 26p
NASA-TN-D-4070
Contract 124-09-03-01-22

Descriptors: *Boiling, *Bubble, *Gravitational effect, *Liquid surface, Alcohol, Calculation, Characteristics, Drag, Dynamics, Effect, Ethyl, Fluid, Force, Gravity, Growth, Heat transfer, Level, Liquid, Property, Separation, Solution, Subcooling, Sucrose, Surface, Tension, Viscosity, Water, Zero.

For abstract, see STAR 05 20.
N67-34980 HC$3.00 MF$0.65

HIGH-PERFORMANCE "ONCE-THROUGH" BOILING OF POTASSIUM IN SINGLE TUBES AT SATURATION TEMPERATURES OF 1500 DEG TO 1750 DEG F.
General Electric Co., Cincinnati, Ohio. Missile and Space Div.
J. R. Peterson. Aug 67, 188p NASA-CR-842
Contract NAS3-2528

Descriptors: *Boiling, *Liquid potassium, *Power reactor, Application, Coefficient, Critical, Design, Facility, Flux, Haynes alloy, Heat, Heat transfer, High performance, Liquid, Metal, Potassium, Power, Reactor, Saturation, Single, Temperature, Test, Tube.

For abstract, see STAR 05 20.
N67-34982 HC$3.00 MF$0.65

THERMAL AND HYDRAULIC PERFORMANCE OF POTASSIUM DURING CONDENSATION INSIDE SINGLE TUBES.
General Electric Co., Cincinnati, Ohio. Missile and Space Div.
S. G. Sawochka. Aug 67, 164p NASA-CR-851
Contract NAS3-2528

Descriptors: *Condensation, *Forced convection, *Heat transfer, *Potassium, *Pressure measurement, Change, Coefficient, Condenser, Convection, Data, Design, Down, Flow, Forced, Mach number, Measurement, Phase, Power, Pressure, Space, System, Temperature, Thermal, Tube, Two, Vertical.

For abstract, see STAR 05 20.
N67-35009 HC$3.00 MF$0.65

MEASUREMENT OF THE COEFFICIENT OF THERMAL CONDUCTIVITY OF FELT-LIKE INSULATING MATERIAL.
Deutsche Forschungsanstalt Fur Luft- Und Raumfahrt, Brunswick (West Germany). Inst. Fuer Flugzeugbau.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 20.
N67-35065 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF HEAT TRANSFER AND PRESSURE DROP OF ARGON FLOWING THROUGH SINGLE TUBE WITH INTERNAL INTERRUPTED FINS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. P. Lynch, and D. Namkoong. Aug 67, 19p
NASA-TM-X-1428
Contract 120-33-07-03-22

Descriptors: *Fin, *Gas tube, *Heat transfer, *Pressure drop, Addition, Application, Argon, Brayton cycle, Calculation, Curve, Drop, Factor, Flow, Friction, Gas, Geometry, Heat, Internal, Louver, Parameter, Plate, Prandtl number, Pressure, Reynolds number, Single, Stanton number, System, Transfer, Tube.

For abstract, see STAR 05 20.
N67-35114 HC$3.00 MF$0.65

FORTRAN IV PROGRAM FOR CALCULATION OF THERMODYNAMIC DATA.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
S. Gordon, and B. J. Mc Bride. Aug 67, 135p
NASA-TN-D-4097
Contract 129-01-02-01-22

Descriptors: *Formation heat, *Fortran, *Thermodynamics, Calculation, Capacity, Constant, Empirical, Energy, Enthalpy, Entropy, Equation, Equilibrium, Formation, Free, Function, Gas, Heat, Property.

For abstract, see STAR 05 20.
N67-35192 HC$3.00 MF$0.65

HEAT CONDUCTION IN HEMISPHERICAL SHELLS WITH APPLICATIONS TO AERODYNAMIC HEATING.
Weapons Research Establishment, Salisbury (Australia).
I. C. Heron. Apr 67, 44p HSA-124

Descriptors: *Aerodynamic heating, *Heat transfer, *Hemispherical shell, *Hypersonic vehicle, *Thermoconductivity, Aerodynamic, Conduction, Flow, Heating, Hemisphere, Hypersonic, Shell, Surface, Temperature, Thickness, Thin, Vehicle, Wall.

For abstract, see STAR 05 20.
N67-35211 HC$3.00 MF$0.65

TRANSIENT THERMAL BEHAVIOR OF SIMPLE STRUCTURES IN A SIMULATED SPACE ENVIRONMENT BY MODEL TESTING.
Illinois Univ., Urbana. Engineering Experiment Station.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 20.
N67-35262 HC$3.00 MF$0.65

THERMAL CONSTANTS OF COMPOUNDS.
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii.
For primary bibliographic entry see Field 7D.
PB-175 626 HC$3.00 MF$0.65

TERMICHESKIE KONSTANTY VESCHESTV, ISSUE 1 (THERMAL CONSTANTS OF COMPOUNDS, ISSUE 1),
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii.
For primary bibliographic entry see Field 7D.
PB-175 627 HC$3.00 MF$0.65

TERMICHESKIE KONSTANTY VESCHESTV, ISSUE 2 (THERMAL CONSTANTS OF COMPOUNDS, ISSUE 2),
Akademiya Nauk SSSR, Moscow. Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii.
For primary bibliographic entry see Field 7D.
PB-175 628 HC$3.00 MF$0.65

SIMILAR SOLUTIONS FOR THE COMPRESSIBLE BOUNDARY LAYER ON A YAWED CYLINDER WITH TRANSPIRATION COOLING.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 915 HC$3.00 MF$0.65

SHIELDING OF PARTIALLY REFLECTING STAGNATION SURFACES AGAINST RADIATION BY TRANSPIRATION OF AN ABSORBING GAS.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif.
John Thomas Howe. 6 Dec 60, 19p NASA-TR-R-95
N62-70519

Descriptors: (*Thermal radiation, Shielding), (*Stagnation point, Absorption), (*Gases, Injection), (*Atmosphere entry, Heat transfer), Hypersonic flight, Boundary layer, Blunt bodies, Reentry vehicles, Surfaces.

The laminar compressible boundary layer for two-dimensional and axisymmetric stagnation regions was analyzed to show the effects of the injection of a radiation absorbing gas on the incident radiation field, on enthalpy profiles, and on heat transfer to the vehicle surface. It is assumed that the energy emitted from the cold foreign gas is negligible compared with that absorbed. It is shown that the reduction of radiation heat-transfer rate to the surface by radiation absorption in the injected gas is accompanied by an increase in the convective heat-transfer rate. For a black surface, a saving in total heat transfer is achieved by injection of an absorbing gas because the total heat transfer is increased. The reflectivity condition between the totally reflecting and the black surface extremes below which it is desirable to inject an absorbing gas is determined. Heat-transfer results are presented and are compared with those of the unshielded case. The required absorption properties of the foreign gas are determined and compared with absorption properties of known gases. (Author)
PB-175 918 HC$3.00 MF$0.65

HYDROGEN ADSORPTION AND CONDENSATION IN A HELIUM CRYOPUMP.
California Univ., Livermore. Lawrence Radiation Lab.
Glen L. Wegmann, Angus L. Hunt, and Ronald K. Goodman. 10 May 67, 10p
Contract W-7405-eng-48

Descriptors: (*Cryopumping, Helium), (*Hydrogen, Adsorption), Condensation, Vapor pressure,

Surface area, Surface temperatures, Ice, Thickness.

For abstract, see NSA 21 18.
UCRL-14291 HC$3.00 MF$0.65

INORGANIC MATERIALS RESEARCH DIVISION ANNUAL REPORT, 1966.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 11B.
For abstract, see NSA 21 17.
UCRL-17330 HC$3.00 MF$0.65

20N. Wave Propagation

THE PROPAGATION OF ULTRASONIC ELASTIC WAVES IN SOLID BODIES AND IN GRANULAR MEDIA.
Final rept.,
Oklahoma Univ. Research Inst., Norman.
Norman H. Ricker. Dec 63, 57p
AFCRL-63-932
Contract AF 19 (604)-8416

Descriptors: (*Mechanical waves, *Propagation), Ultrasonic properties, Differential equations, Low frequency, Thermal diffusion, Absorption, Seismic waves, Velocity, Sound, Vibration, Seismology, Vacuum, Measurement.

Contents: The problem of the nature of the seismic absorption process (scaling down of dimensions to permit studies within a physical laboratory, the wavelet theory of seismogram structure and the Stokes Wave Equation, the nature of the sound absorption process in metals, the analogy existing between the structure of a metal and of a granular solid whose pore spaces are filled with a monatomic gas); Experimental plans and methods of measurement (preparation of the synthetic medium, controlling the environment of the medium, measurement of the low frequency sound velocity and the transition frequency of the medium, measurement of the thermal diffusivity of the medium); Experimental studies (preliminary experiments, use of the ultrasonic attenuation comparator, use of transient elastic disturbances, problems connected with the use of the attenuation comparator, problems connected with the use of the transient elastic disturbances, measurement of the thermal diffusivity of the medium). (Author)
AD-430 191 HC$3.00

GENERALIZED SCATTERING MATRIX EQUATIONS FOR WAVEGUIDE STRUCTURES OF VARYING SURFACE IMPEDANCE BOUNDARIES.
Revised ed.,
Colorado Univ Boulder Dept of Electrical Engineering
E. Bahar. 26 Sep 66, 11p
Contract CST-7348, ARPA Order-183-62
Revision of manuscript submitted 26 Aug 66.
Availability: Published in Radio Science v2 (New Series) n3 p287-97 Mar 3 1967, Paper (2-3-197).

Descriptors: (*Waveguides, Boundary value problems), (*Electromagnetic waves, Propagation), Electromagnetic properties, Radio waves, Wave transmission, Electrical impedance, Scattering, Mathematical analysis.

An infinite set of coupled first-order differential equations is derived for the complex amplitude of the forward and backward waves in multimode waveguide structures of varying surface impedance boundaries. Using a quasi-optical approach in the first analysis, the waveguide is considered to consist of an infinity of elementary waveguide sections, with an infinitesimal variation of the surface impedance between two such adjacent waveguides. The second analysis is an extension to the application of the generalized telegraphist's equations for nonuniform waveguides. The two methods are compared in general. Finally, waveguide structures with varying surface impedance boundaries and nonuniform cross sections are considered. (Author)
AD-657 548 Not available from CFSTI.

OPTICAL METHOD FOR ANALYSIS OF ATMOSPHERIC EFFECTS ON LASER BEAMS.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 20E.
AD-657 559 HC$3.00 MF$0.65

STATISTICAL PROPERTIES OF ELECTROMAGNETIC RADIATION.
Final rept. 1 Aug 64-31 Jul 67,
Rochester Univ N Y Dept of Physics and Astronomy
Emil Wolf. Aug 67, 28p
AROD-4965:28-P
Grant DA-ARO (D)-31-124-G569

Descriptors: (*Electromagnetic waves, Scientific research), Electromagnetic fields, Bibliographies, Abstracts, Coherent radiation, Correlation techniques, Field theory, Optics, Lasers, Scattering, Light, Diffraction, Photoelectrons, Statistical distributions.

The research carried out was chiefly concerned with the following topics: Behavior of the electromagnetic field in the focal region of a coherent beam, coherence effects of second and higher orders, correlation techniques in classical and quantum optics, theory of photoelectric detection of light fluctuations, phase space distributions of fluctuating electromagnetic fields, fluctuations in laser beams, Thomson scattering in intense laser beams, and correlation effects in many atom radiation processes. (Author)
AD-657 586 HC$3.00 MF$0.65

ELECTROMAGNETIC INTERFERENCE MEASUREMENT METHODS-SHIELDED ENCLOSURE.
Quarterly rept. no. 3, 1 Dec 66-28 Feb 67,
Georgia Inst of Tech Atlanta Engineering Experiment Station
W. R. Free, C. H. Bonham, R. E. Gibson, and B. M. Jenkins. Aug 67, 46p Rept no. 35
ECOM-02381-3
Contract DA-28-043-AMC-02381 (E)
See also AD-657 669.

Descriptors: (*Electromagnetic shielding, Antennas), (*Radiofrequency interference, Measurement), Conical antennas, Log periodic antennas, Helical antennas, Theory, Antenna radiation patterns, Army equipment, Communication equipment, Microwave frequency, Ultrahigh frequency.

Investigation of techniques and procedures for making radiated measurements in shielded enclosures, which can be correlated with measurements made in the open-field, have continued. A microwave hooded antenna for use over the 1 to 12 GHz frequency range was evaluated after a modification to integrate a series injection calibration network into the antenna structure. The results of this evaluation indicate that the characteristics of the probe antenna are acceptable. An evaluation of a UHF hooded antenna for use over the 200 to 1500 MHz region was completed. The results of this evaluation indicate that the characteristics of the hooded probe antenna are acceptable. A series of antenna coupling measurements were performed in an 8 x 8 x 12 foot shielded enclosure over the frequency range from 1 to 100 MHz. The results from these measurements were compared with results obtained in an 8 x 8 x 20 foot enclosure to determine the effects of enclosure dimensions on measurements in this frequency range. A computer program for simulating reflection conditions in a shielded enclosure was completed during this period. The development of the computer program and a discussion of preliminary results obtained with the program are presented. (Author)
AD-657 669 HC$3.00 MF$0.65

SURFACE ELASTIC-WAVE PROPAGATION AND AMPLIFICATION.
Revised ed.,
California Univ Berkeley Dept of Electrical Engineering
Richard M. White. 7 Jan 67, 12p
AROD-5718:3
Grants DA-ARO (D)-31-124-G678, NSF-GK-431
Revision of manuscript submitted 29 Nov 66.
Availability: Published in IEEE Transactions on Electron Devices vED14 n4 p181-9 Apr 1967.

Descriptors: (*Mechanical waves, Propagation), Semiconductors, Piezoelectric crystals, Transducers, Amplifiers, Electronic equipment, Cadmium sulfides.

Surface elastic-wave propagation, transduction, and amplification (in a piezoelectric semiconductor) are discussed with emphasis on characteristics useful in electronic devices. Computed curves show the dependence on distance from the surface of the elastic and the electric fields associated with surface elastic-wave propagation in cadmium sulfide. The interaction impedance, relating the external electric field to power flow, is computed for propagation on the basal plane of CdS and found to be low in comparison with values characteristic of electromagnetic slow-wave circuits. Amplification with a continuous drift field in cadmium sulfide is reported, and differences between surface- and bulk-wave amplifiers are discussed. Some operating characteristics and fabrication techniques for making electrode transducers on piezoelectric crystals are given, together with experimental results on several passive surface-wave devices. (Author)
AD-657 722 Not available from CFSTI.

WAVE INTERACTIONS WITH MOVING BOUNDARIES.
Revised ed.,
Stanford Univ Calif
C. S. Tsai, and B. A. Auld. 24 Oct 66, 13p
AFOSR-67-2072
Contract AF 49 (638)-1429
Revision of manuscript submitted 20 Jun 66.
Availability: Published in Journal of Applied Physics v38 n5 p2106-15 Apr 1967.

Descriptors: (*Doppler effect, Electromagnetic waves), Interactions, Mathematical analysis, Frequency, Vacuum, Wave transmission, Velocity, Transformations (Mathematics).

The general theory of the double Doppler effect is reviewed for both vacuum and material media. Frequency and amplitude changes in the reflected and transmitted waves at a partially reflecting moving interface are calculated for cases in which the medium behind the interface: (a) moves at a different velocity than the interface; (b) moves at the interface velocity; (c) is stationary. The advantages of case (c) for practical frequency conversion are discussed. Multiple moving interfaces in a stationary medium are also considered. On the basis of this theory, Doppler shifts at moving, tapered transition regions are analyzed as a series of discrete, closely spaced step. This shows that the frequency conversion of the transmitted wave is independent of the slope of the taper. By use of a transmission line model, a simple physical explanation is given for the double Doppler effect in a moving taper. (Author)
AD-657 891 Not available from CFSTI.

SOME PROPERTIES OF HIGHER ORDER COHERENCE FUNCTIONS,
Rochester Univ N Y Dept of Physics and Astronomy
C. L. Mehta, and L. Mandel. 1967, 10p

AFOSR-67-2053
Contract AF 49 (638)-1532
Availability: Published in Electromagnetic Wave Theory p1069-75 1967.

Descriptors: (*Electromagnetic waves, Theory), Electromagnetic fields, Theorems, Mathematical analysis, Intensity, Integral transforms.

Correlation functions and spectral densities of arbitrary order (N + M) are defined in terms of the complex amplitudes of the electromagnetic field. For stationary fields the relation between them is shown to be of the form of a generalized Wiener-Khintchine theorem involving an (N + M - 1) - fold Fourier integral. Some properties of the correlation functions are then examined for quasi-monochromatic fields. It is found that, under certain conditions, the relation between correlations and spectral densities of order N + N can be reduced to an N-fold multiple Fourier integral. Some examples of the application of the theorem to intensity correlations are given. (Author)
AD-657 897 Not available from CFSTI.

EFFECT OF ELECTROMAGNETIC FORCE ON THE STABILITY OF LIQUID FILMS.
Illinois Univ Urbana Dept of Electrical Engineering
For primary bibliographic entry see Field 7D.
AD-657 915 Not available from CFSTI.

MEASUREMENT AND PREDICTION OF GROUP VELOCITY AT VERY LOW RADIO FREQUENCIES.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
J. A. Pierce. Jul 67, 123p Rept no. TR-535
Contracts Nonr-1866 (07), Nonr-1866 (32)

Descriptors: (*Radio transmission, Very low frequency), Velocity, Propagation, Radio navigation, Phase, Time.

Sample measurements of times of arrival of Omega signals in the VLF frequency band are reduced to approximate times of propagation and then to the reciprocal of the relative velocity of propagation. A function of the altitude of the sun is then found which, when integrated along the transmission path, yields a synthesis of the transmission time. Two of these functions for two frequencies yield the group transmission time for a difference frequency. It is suggested that this function will make a convenient means for intercomparing data for different paths and different frequencies, in the expectation that corrections can then be made for various factors that have a minor effect upon the speed of propagation. Identification of the importance of these factors should lead to better prediction of the absolute velocity for any path at any time. (Author)
AD-657 949 HC$3.00 MF$0.65

ELECTROMAGNETIC WAVE PROPAGATION AND THE UPPER ATMOSPHERE.
Rept. no. 4 on ATD work assignment no. 3.
Library of Congress Washington D C Aerospace Technology Div
21 Sep 67, 52p Rept no. ATD-67-36
TT-67-62819
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Electromagnetic waves, Upper atmosphere), (*Ionospheric propagation, Reports), Ionosphere, Magnetosphere, Solar radiation, Aurorae, Satellites (Artificial), Magnetic storms, Radio astronomy, Terrestrial magnetism, Guided missiles, Radio transmission, USSR.

The study is the fourth in a series of reports reviewing Soviet research on electromagnetic wave propagation and the upper atmosphere. Abstracts contained in the report were selected from Soviet open-source literature available at the Aerospace Technology Division and the Library of Congress. Information not directly related to the assigned subject has been included because of its broad implications for study in this field. The 29 abstracts are arranged alphabetically by author within each of the following categories: ionosphere, exosphere, and magnetosphere; geomagnetic micropulsations and earth currents; ionospheric perturbations by explosions, satellite and missile passage, solar radiation, etc.; satellite and missile experiments; radio and radar astronomy; aurora and geomagnetic disturbances. A bibliography is presented at the end of the report. (Author)
AD-658 005 HC$3.00 MF$0.65

TECTONIC FEATURES OF THE EARTH'S CRUST AND UPPER MANTLE.
Final technical rept.,
Pittsburgh Univ Pa Dept of Earth and Planetary Sciences
Walter L. Pilant. Aug 67, 46p
AFOSR-67-1797
Contract AF 49 (638)-1534

Descriptors: (*Rayleigh waves, Phase measurement), (*Seismology, North America), Reflection, Energy, Refraction, Terrain, Mountains, Velocity, Tables.

The report deals primarily with a study of Rayleigh surface waves crossing the continent of North America. From this study, a Rayleigh wave phase velocity map was constructed. Features prominent on this map are the following: a large region of high velocities under the Canadian Shield, a prominent low velocity region generally under the Basin and Range province of the western United States moving towards the east as the period shortens from 51 to 20 seconds, a sharp gradient in phase velocity as one traverses the Northern Rocky Mountain region, an isolated region of higher velocities at the southern end of the Appalachian mountains at 51 and 40 seconds period, a region of lower velocities migrating from west of the St. Lawrence River at a period of 51 seconds, to under the Ohio, Indiana, Kentucky region at a period of 20 seconds, generally higher values of phase velocity on the east coast of North America compared to the west coast. A subsidiary investigation revealed the scattering of long period seismic energy by the velocity gradient under the Rocky Mountains. (Author)
AD-658 053 HC$3.00 MF$0.65

STUDIES OF GUIDED ELECTROMAGNETIC WAVES IN THE PRESENCE OF AXIALLY NONUNIFORM OR RANDOM PERTURBATIONS,
Columbia Univ New York Dept of Electrical Engineering
Stephen Lawrence Richter. Mar 67, 209p Rept no. Scientific-3
AFCRL-67-0298
Contract AF 19 (628)-5832
See also AD-654 596.

Descriptors: (*Waveguides, Wave transmission), (*Electromagnetic waves, Propagation), Perturbation theory, Scattering, Ionospheric propagation, Radio waves, Very low frequency, Iterative methods, Antenna radiation patterns.

A perturbation technique to deal with gross nonuniformities in an otherwise axially uniform waveguiding structure is presented and applied to time-harmonic electromagnetic propagation in the presence of not necessarily small perturbations which may have both axial and transverse dependence and may be either deterministic or random. The method, an iterative procedure similar to the Brillouin-Wigner approach for uniform perturbations, circumvents expansions in powers of a perturbation parameter, which is one cause of poor convergence for perturbations not sufficiently small. As in standard analyses, an expansion in normal modes is utilized, but with the inclusion of a nonlinear phase progression term. Several deterministic examples, chosen to indicate the flexibility of the perturbation analysis to cope with a wide class of electromagnetic problems, are presented. Following a demonstration of the convergence, through an example whose exact solution is known, the method is applied to problems involving radiation from axial arrays of parasitic elements perturbing an open traveling wave structure. The technique is next applied to long distance very low frequency propagation in an idealized 'earth-ionosphere waveguide'. The analysis is finally applied to propagation in waveguides containing media with statistically inhomogeneous, random, gross inhomogeneities over a finite axial range. (Author)
AD-658 056 HC$3.00 MF$0.65

ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES. PHASE C: ABSORPTION OF ELECTROMAGNETIC cm-WAVES IN ANISOTROPIC MEDIA.
Final technical rept.,
Goettingen Univ (West Germany) Physikalisches Institut
Reinhard Pottel. 31 Jul 57, 30p
Contract AF 61 (514)-1041
See also PB-132 770.

Descriptors: (*Electromagnetic waves, Absorption), (*Wave transmission, Electromagnetic waves), West Germany, Anisotropy, Ferrites, Ferromagnetic materials, Permeability, Dielectric properties, Resonant frequency, Magnetic fields, Attenuation.

With ferrite materials available up to date, equalness of permeability and dielectric constant cannot be achieved for frequencies above 1000 Mc/s without application of static magnetic fields. The reason is given by the large spreading of the natural resonant frequencies of different crystallites or domains. This spreading can be reduced but cannot be completely avoided in principle. Using static magnetic fields, equalness of permeability and dielectric constant in ferrites can be achieved up to frequencies of about 5000 Mc/s. The relative width of the frequency band within which the reflection coefficient is below 0.1 then is about 15%. A widening of this range is necessarily coupled with a reduction of the limiting frequency. For equal permeability and dielectric constant the attenuation along one vacuum wave length at 5000 Mc/s is about 500 dB. Because of the difficulties arising in homogeneously magnetizing larger plates of ferrite material, the discussed method cannot be used for large absorber arrangements. (Author)
AD-658 083 HC$3.00 MF$0.65

STUDY OF TRANSVERSE WAVE INTERACTIONS.
Triannual rept. no. 3, 1 Jan-30 Apr 67,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
R. L. Schriever, C. H. Durney, K. I. Talbot, and R. W. Grow. Aug 67, 49p Rept no. 7, UTEC-MD-67-030
ECOM-01279-7
Contract DA-28-043-AMC-01279 (E)
See also AD-655 002.

Descriptors: (*Microwaves, Interactions), (*Electron beams, Electromagnetic fields), Rotation, Waveguides, Cyclotron waves, Space charges, Direct current, Microwave amplifiers.

The purpose of this project is to analytically and experimentally evaluate the interaction of waves in a wave guide with waves on a rotating electron beam. The methods of analysis include use of a general coupled-mode theory, a ballistic computer program, and an experimental evaluation. A new tube is being constructed in which the interaction current can be measured, and the reflection of

power in the interaction will be reduced. Space-charge effects have been found to split the longitudinal modes so that they are no longer degenerate. Their effect on the coupling coefficients is small, and can be neglected in the first-order perturbation theory. The multiple-beam interaction has been analyzed, and it has been found that the single-beam analysis can be used if the d-c beam current of the multiple beam is replaced by an effective d-c beam current. Boundary conditions are imposed upon the five interacting modes, and it is found that only three waves are excited in the system. Two of these waves travel at beta sub e and are not excited. This allows the start-oscillations conditions to be found as a function of the device parameters for the backward-wave interactions. The problem of power saturation of the backward-wave oscillations has been initiated. Small-signal theory is used to determine an expression for the efficiency. The axial bunching in the O-type backward-wave oscillator is examined to determine how it is related to the a-c current for power saturation so that criteria for determining power saturation may be established for our device. (Author)
AD-658 084 HC$3.00 MF$0.65

ON SOLVING ELASTIC WAVEGUIDE PROBLEMS INVOLVING NON-MIXED EDGE CONDITIONS.
Technical rept.,
California Inst of Tech Pasadena Div of Engineering and Applied Science
Julius Miklowitz. Aug 67, 49p Rept no. TR-5
Contract Nonr-220 (57)

Descriptors: (*Propagation, *Mechanical waves), Waveguides, Metal plates, Stresses, Integral transforms, Theory, Elasticity, Integral equations, Excitation.

Within the framework of the 'exact' linear theory an important class of wave propagation problems in elastic waveguides, involving non-mixed edge conditions (like stress or displacement), have remained unsolved. Basically, this is because known separation methods (classical or integral transforms) do not 'ask' in a natural way for the given edge information. A means for solving some problems in this class, focused on the semi-infinite plate, as an example, is presented here. In the method a Laplace transform is used on the propagation coordinate, say x. Exploitation of the boundedness condition on the solution, at x to infinity, generates two coupled integral equations for the edge unknowns (displacements and strains), which depend, parametrically, on those complex wave number roots of the governing Rayleigh-Lamb frequency equation representing unbounded waves. Solution of these equations determines the transformed solution of the problem, which can be inverted through known techniques. Excitation of a plate with a built-in edge is treated as an example. (Author)
AD-658 145 HC$3.00 MF$0.65

ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES. PHASE A: CM-WAVE ABSORPTION IN AQUEOUS SOLUTIONS OF ELECTROLYTES.
Annual technical rept.,
Goettingen Univ (West Germany) Physikalisches Institut
R. Pottel. 30 Sep 59, 41p
Contract AF 61 (052)-154
See also AD-658 083.

Descriptors: (*Electromagnetic waves, Absorption), Attenuation, Dielectric properties, Electrolytes, Solutions, Beryllium compounds, Sulfates, Aluminum compounds, Conductivity, Frequency, Temperature, Metal plates.

From attenuation and phase measurements at the frequencies 4, 8 and 25.3 kmc/s the complex relative dielectric constant epsilon of aqueous BeSO4- and Al2 (SO4)3-solutions has been determined for the temperature 25C in dependence on concentration up to 6 gram equival./1. The obtained epsilon-values approximately comply to Cole-Cole-Diagrams which for increasing electrolyte concentration show reduction of the static dielectric constant, shift of the water relaxational absorption range towards lower frequencies and its broadening. The question is treated, in as far thin layers of water and aqueous electrolytic solutions on a metal plate can be made reflectionless absorbing for normal incident waves. (Author)
AD-658 192 HC$3.00 MF$0.65

STUDY OF CROSSED-FIELD AMPLIFIERS.
California Univ Berkeley Electronics Research Lab
For primary bibliographic entry see Field 9E.
AD-658 200 HC$3.00 MF$0.65

QUASI-STATIC FIELDS OF ELECTRIC DIPOLE ANTENNAS AT THE SURFACE OF AN ANISOTROPIC HALF-SPACE.
Navy Underwater Sound Lab New London Conn
For primary bibliographic entry see Field 9E.
AD-658 320 HC$3.00 MF$0.65

CURRENT TRANSFORM METHOD FOR CALCULATING RADIATION FIELDS,
New Mexico State Univ University Park Physical Science Lab
Ralph Dressel. 25 Mar 55, 64p
Contract NOrd-9939
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2354.

Descriptors: (*Electromagnetic fields, Propagation), Partial differential equations, Electric currents, Antennas, Mathematical analysis.
Identifiers: Wave equation.

An exact expression is derived for the electromagnetic field radiated by an arbitrary distribution of charge and current located within a bounded region of space. An expansion of the current distribution in terms of spherical harmonics expressed about the origin yields an infinite series which may be integrated term by term to evaluate the vector potential. The characteristic current functions together with the corresponding terms in the vector potential expansion provide a set of transform pairs. These may be identified as the effective multipole components of the extended source distribution. Applications of the method have been made to determine the radiation from a linear, half-wave doublet antenna and to the radiation from the current induced in a paraboloid reflector. These reduce to the known solutions obtained by other methods. The principal advantages of the current transform method are its greater generality and its greater accuracy compared with other methods of calculation. (Author)
AD-658 339 HC$3.00 MF$0.65

IONOSPHERIC DATA FOR NOVEMBER 1966 FROM SALISBURY, SOUTH AUSTRALIA.
Weapons Research Establishment, Salisbury (Australia).
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 20.
N67-34279 HC$3.00 MF$0.65

INVESTIGATIONS ON MATCHING TRANSITIONS BETWEEN WAVEGUIDES AND LECHER WIRES IN THE 3CM REGION.
Untersuchungen An Transformationsgliedern Zwischen Hohlleitern Und Lecherdraehten Im 3cm-gebiet
Ins itut Fur Plasmaphysik G.M.B.H., Garching (West Germany).
H. Klingenberg, W. Makios, G. Meinhold, and A. Siddiqui. Mar 67, 24p IPP-3/53
in German, English Summary

Descriptors: *Electromagnetic measurement, *Microwave frequency, *Plasmaguide, *Wire, Electromagnetic, Fluctuation, Frequency, Germany, Loss, Measurement, Microwave, Ohm, Plasma, Point, Radiation, Reflection, Shock, Source, Transition, Tube, Wave, Waveguide.

For abstract, see STAR 05 20.
N67-34837 HC$3.00 MF$0.65

IONOSPHERE DATA, VERTICAL ECHO SOUNDING - FREIBURG, U R S I-CODE 131.
Ionospharen-institut Breisach (West Germany).
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 20.
N67-34959 HC$3.00 MF$0.65

STEEPEST DESCENT AND THE MERGING OF SEVERAL WAVES.
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
C. Comstock. 15 Aug 67, 25p NASA-CR-87652, SR-303
Grant NSG-134-61

Descriptors: *Numerical analysis, *Wave interaction, Analysis, Approximation, Asymptote, Descent, Equation, Integral, Interaction, Merge, Numerical, Propagation, Property, Steepness, Structure, Wave.

For abstract, see STAR 05 20.
N67-35015 HC$3.00 MF$0.65

HOW TO UNDERSTAND SPECIAL RELATIVITY,
Division of Research (AEC), Washington, D. C.
For primary bibliographic entry see Field 20J.
For abstract, see NSA 21 18.
TID-23694 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21B. Combustion and Ignition

CATALYTIC EFFECTS OF THERMOCOUPLE MATERIALS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 14B.
AD-284 880 HC$3.00

INVESTIGATION OF THE MECHANISMS OF DECOMPOSITION, COMBUSTION, AND DETONATION OF SOLIDS.
Technical rept. 1 Apr-30 Jun 63.
Aerojet-General Corp., Azusa, Calif.
1963, 26p TR-14, 0372-01-14
Contract AF 49 (638)-851, ARPA Order-24-60

Descriptors: (*Solid rocket propellants, Combustion), (*Solid rocket oxidizers, Combustion), (*Combustion, Thermochemistry), Flames, Jet flames, Ammonia, Oxygen, Chlorine, Ammonium perchlorate, Decomposition, Detonations.

Apparent flame strengths for the NH3-O and NH3-O-Cl reactions were determined as a function of reactor pressure, using the opposed-jet technique and 0.77-cm-ID nozzles. It was shown that the NH3-O flame strength is dependent on the square of the reactor pressure when both 0.46- and 0.77-cm jets are used. The proportionality of the flame strength with the diameter of the jet, which is required by theory, was also demonstrated. Apparent flame strength measurements for NH3 as fuel, with O-Cl mixture as oxidizer, were made at 300, 450, 600 and 745 torr. The flame strength was inversely proportional to the mass fraction of Cl2 in the mixture. Extrapolations to

zero flame strength indicated that no flame is possible at mass fractions of Cl of approximately 0.5. Analyses of the data for NH3-O-Cl systems indicate that Cl does not act as a diluent but competes with O in reaction with NH3. The three-component system also shows flame strength dependence on the square of the reactor pressure. (Author)
AD-413 100 HC$3.00

INVESTIGATION OF THE MECHANISMS OF DECOMPOSITION, COMBUSTION, AND DETONATION OF SOLIDS.
Technical operating rept. no. 17, 1 Jan-31 Mar 64.
Aerojet-General Corp., Azusa, Calif.
Jun 64, 19p Rept. no. 0372-01-17
Contract AF 49 (638)-851, ARPA Order-24-60

Descriptors: (*Solid rocket propellants, Combustion), (*Solid rocket oxidizers, Combustion), (*Combustion, Thermochemistry), Flames, Jet flames, Ammonia, Chlorine, Oxygen, Ammonium perchlorate, Reaction kinetics, Mass spectrum, Decomposition, Detonations.

The over-all stoichiometries of the ammonia-oxygen and ammonia-chlorine flame reactions were deduced from mass spectrographic analyses of the gaseous reaction products and from reaction parameters for the opposed-jet diffusion flame. The volumetric reaction rate and heat release rate for the first reaction is 7.35 and 25,200 cal/cu cm.-sec., respectively. The volumetric rate of the second reaction is 3.67 g/cu. cm.-sec., which corresponds to a volumetric heat release rate equal to 9,920 cal/cu. cm.-sec. (Author)
AD-442 487 HC$3.00

FLAMMABILITY OF SPACECRAFT WIRE IN AN OXYGEN ATMOSPHERE,
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 22B.
AD-479 568 HC$3.00 MF$0.65

PERFORMANCE OF AMMONIA-FIRED GAS-TURBINE COMBUSTORS.
California Univ Berkeley Thermal Systems Div
For primary bibliographic entry see Field 21E.
AD-657 585 HC$3.00 MF$0.65

THE HEATS OF COMBUSTION OF POLYTETRAFLUOROETHYLENE (TEFLON) AND GRAPHITE IN ELEMENTAL FLUORINE,
National Bureau of Standards Washington D C Inst for Basic Standards
For primary bibliographic entry see Field 7D.
AD-657 733 Not available from CFSTI.

FIRST LIMIT OF THE HYDROGEN + OXYGEN REACTION IN VESSELS COATED WITH BARIUM BROMIDE,
Manchester Coll of Science and Technology (England) Dept of Chemistry
A. C. Howson, and R. F. Simmons. 27 Feb 67, 13p
AFOSR-67-1990
Grant AF-EOAR-62-88
Availability: Published in Transactions of the Faraday Society v63 n534 Pt6 1385-93 Jun 1967.

Descriptors: (*Hydrogen, Explosions), (*Oxygen, Explosions), (*Explosive gases, Stability), Combustion, Containers, Coatings, Barium compounds, Bromides, Reaction kinetics, Surface properties, Great Britain.
Identifiers: Barium bromide.

The first explosion limit of the hydrogen + oxygen reaction was determined over a wide range of mixture composition and vessel diameter for reaction vessels coated with barium bromide. The kinetic results suggest that only oxygen atoms and/or hydroxyl radicals are des royed at the surface of the vessel, but a more detailed analysis shows that this cannot be the case. The magnitude of the observed explosion pressures is incompatible with the accepted values of the rate constants for the reactions of oxygen atoms and hydroxyl radicals with hydrogen. Hydrogen atoms must be destroyed at the surface, and the kinetics of the destruction are such that the characteristic kinetic features associated with this mode of chain termination disappear. The efficiency of the barium bromide surface for the destruction of hydrogen atoms is directly proportional to the partial pressure of oxygen in the reaction mixture, and possible reasons for this behaviour are discussed. (Author)
AD-657 737 Not available from CFSTI.

ON LIQUID DROPLET COMBUSTION AT HIGH PRESSURES.
Revised ed.,
Aerochem Research Labs Inc Princeton N J
Daniel E. Rosner. 11 Aug 66, 6p
AFOSR-67-2042
Contract AF 49 (638)-1654
Revision of manuscript submitted 1 Jun 66.
Availability: Published in AIAA Journal v5 n1 p163-6 Jan 1967.

Descriptors: (*Combustion, *Drops), (*Fuel sprays, Burning rate), Vaporization, Pressure, Particle size, Kerosene, Liquid rocket propellants, Liquid rocket oxidizers.

A study was made of the effects of vapor source distribution on the predicted burning times of droplets at supercritical pressures. Also, the pressure dependence of the normalized combustion and/or vaporization time for a fuel (kerosine) droplet is reported.
AD-657 890 Not available from CFSTI.

CALCULATIONS OF FLAME TEMPERATURES AND BURNING VELOCITIES FOR HYDROGEN-CHLORINE MIXTURES,
Texas Univ Austin Defense Research Lab
Robbin C. Anderson. 24 Mar 53, 28p Rept no. DRL-322
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-1978.

Descriptors: (*Chlorine, *Flames), (*Hydrogen, Flames), Temperature, Burning rate, Numerical analysis, Specific heat, Heat of reaction.

The techniques used for theoretical calculations of flame properties for the hydrogen-bromine system were extended to hydrogen-chlorine mixtures. Flame temperatures were calculated, and burning velocities determined by the equations of Frank-Kamenetsky, Tanford, and Manson. Calculated values are compared with experimental data and calculations of Bartholome. (Author)
AD-658 106 HC$3.00 MF$0.65

MINIMUM SPARK IGNITION ENERGIES FOR HYDROGEN-BROMINE MIXTURES,
Texas Univ Austin Defense Research Lab
Tom D. Brotherton, and Robbin C. Anderson. 25 Aug 53, 24p Rept no. DRL-335
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. CF-2051.

Descriptors: (*Bromine, *Ignition), (*Hydrogen, Ignition), Sparks, Energy, Numerical analysis, Specific heat, Thermal conductivity, Burning rate.

Experimental measurements were made of the minimum spark ignition energies for hydrogen-bromine mixtures of various compositions. The results are compared with values calculated from the equation of Lewis and von Elbe. Calculated values are much higher than experimental, and the range of difference is greater than is explainable by experimental errors. Experimental results in general, however, indicate that ignition probably involves a thermal mechanism. (Author)
AD-658 109 HC$3.00 MF$0.65

GAS FLOW TRACING IN BAFFLE-STABILIZED FLAMES,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
H. L. Olsen, E. L. Gayhart, and L. W. Bennett. 9 Jul 54, 9p Rept no. CF-2236
Contract NOrd-7386

Descriptors: (*Flames, *Flow visualization), Stabilization, Baffles, Gas flow, Turbulence, Jets, Propanes, Penetration.

Three methods are discussed which permit detailed study of the recirculation zone of baffle-stabilized flames. The cold flow pattern bears no resemblance to the recirculation flow pattern in baffle-stabilized flames. The turbulence level within the recirculation zone of a baffle-stabilized flame is certainly an order of magnitude less than that of the cold flow. Assumption of instantaneous mixing in treating the recirculation zone appears not to be warranted in flames such as shown in the report. The direction of flow of the gases within the recirculation zone may be indicated by using a small tracer jet of propane. The magnitude of the recirculation velocity can be determined as a function of position throughout the recirculation zone by the jet penetration method described. (Author)
AD-658 130 HC$3.00 MF$0.65

THE INTERACTION OF SOUND WAVES WITH FLAME IN A DUCT,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Philip Rosen. 23 Feb 54, 21p Rept no. CF-2180
Contract NOrd-7386

Descriptors: (*Flames, *Sound), (*Combustion, Sound), Interactions, Ducts, Resonant frequency.

Approximate boundary conditions for sound waves at a discontinuity in temperature, pressure and flow velocity where heat is evolved are derived for the one-dimensional case. These conditions are used to obtain the resonant frequencies of a duct containing a flame. It is assumed that changes in heat evolution depend solely on pressure changes and an approximate condition for maintenance of sound by the flame is found. (Author)
AD-658 133 HC$3.00 MF$0.65

BURNING VELOCITIES IN HYDROGEN-BROMINE AND DEUTERIUM-BROMINE MIXTURES,
Texas Univ Austin Defense Research Lab
Stone D. Cooley, and Robbin C. Anderson. 23 Jul 53, 33p Rept no. DRL-333
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2049.

Descriptors: (*Bromine, *Burning rate), (*Hydrogen, Burning rate), (*Deuterium, Burning rate), Flames, Mathematical prediction, Specific heat, Thermal conductivity, Reaction kinetics.

Measurements were made of flame velocities in straight tubes for hydrogen-bromine and deuterium-bromine mixtures. From these the burning velocities were determined. The results for hydrogen-bromine mixtures were in agreement with earlier data based on Bunsen-type flames, though absolute values of burning velocities are somewhat lower. Comparison of the observed effects of substituting deuterium for hydrogen with predictions based on various theoretical equations showed that the Manson equation gave poor results but the Tanford and Semenov-Frank-Kamenetsky equations gave equally satisfactory predictions.
AD-658 147 HC$3.00 MF$0.65

CALCULATIONS OF BURNING VELOCITIES FOR HYDROGEN-BROMINE MIXTURES. IV. EQUATION OF SEMENOV AND FRANK-KAMENETSKY AND MANSON EQUATIONS. V. ADDITIONAL CALCULATIONS BY MALLARD-LE CHATELIER EQUATION,
Texas Univ Austin Defense Research Lab
Robbin C. Anderson. 19 Mar 53, 11p Rept no. DRL-317
Prepared in cooperation with Johns Hop zns Univ., Silver Spring, Md. Applied Physics Lab. CF-1953.

Descriptors: (*Bromine, *Burning rate), (*Hydrogen, Burning rate), Flames, Numerical analysis, Equations, Thermodynamics.

Calculations of burning velocities in hydrogen-bromine mixtures were extended to include values based on the equation developed by Semenov, Frank-Kamenetsky and others and that developed by Manson. Additional exploratory calculations using the Mallard-Le Chatelier equation (see AD-630 831) are also summarized. (Author)
AD-658 149 HC$3.00 MF$0.65

VIBRATORY EFFECTS IN HYDROGEN-BROMINE FLAMES IN TUBES,
Texas Univ Austin Defense Research Lab
Stone D. Cooley, and Robbin C. Anderson. 24 Feb 53, 5p Rept no. DRL-316
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-1952.

Descriptors: (*Bromine, Flames), (*Hydrogen, Flames), (*Flames, Vibration), Flame propagation, Stability, Pipes.

A brief summary is given of observations of vibratory effects in hydrogen-bromine flames propagating in open tubes under various conditions. No extended quantitative study was made, but the results are of general interest for comparison with those for hydrocarbon fl mes. (Author)
AD-658 150 HC$3.00 MF$0.65

EFFECT OF DILUENTS ON BURNING VELOCITIES IN HYDROGEN-BROMINE MIXTURES,
Texas Univ Austin Defense Research Lab
M. C. Huffstutler, J. A. Rode, and R. C. Anderson. 3 Aug 53, 15p Rept no. DRL-334
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2050.

Descriptors: (*Bromine, *Burning rate), (*Hydrogen, Burning rate), Flames, Additives, Nitrogen, Argon, Helium, Stability.

Experiments on the effects of diluents on burning velocities in H2-Br2 mixtures were made using N2, A, and He as diluents, with 10 percent and 25 percent of diluent and at 50C and 200C. The predominant trend is for a decrease in burning velocity with the magnitude of the effect varying in the order He<A<N2. With the lesser amounts of helium, burning velocities were actually increased somewhat on occasion. The region of stable flame was shifted toward higher bromine percentages when diluents were added.
AD-658 152 HC$3.00 MF$0.65

CALCULATIONS OF THERMAL AND DIFFUSIONAL EFFECTS IN HYDROGEN-BROMINE FLAMES,
Texas Univ Austin Defense Research Lab
Katherine C. Hellwig, and Robbin C. Anderson. 20 Mar 53, 13p Rept no. DRL-318
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-1954.

Descriptors: (*Bromine, *Flames), (*Hydrogen, Flames), Thermal properties, Concentration (Chemistry), Diffusion, Reaction kinetics.

Temperature gradients near the flame front and the concentration gradients for H atoms resulting from diffusion were calculated for the hydrogen-bromine system. These results indicate that reaction resulting from such diffusion can be much greater than that resulting from the heat flow. Relative diffusion rates of H2 and Br2 into the flame front were also calculated, and the significance of these with regard to flame shapes and other properties is discussed. (Author)
AD-658 153 HC$3.00 MF$0.65

CALCULATIONS OF BURNING VELOCITIES FOR HYDROGEN BROMINE MIXTURES. VI. EFFECTS OF INITIAL TEMPERATURE,
Texas Univ Austin Defense Research Lab
Robbin C. Anderson. 9 Apr 53, 17p Rept no. DRL-323
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-1979. See also AD-658 149.

Descriptors: (*Bromine, *Burning rate), (*Hydrogen, Burning rate), Flames, Numerical analysis, Temperature, Free radicals, Concentration (Chemistry), Heat of activation.

Earlier calculations of temperatures and free radical concentrations were revised on the basis of the assumption that constant pressure is maintained throughout reaction. Burning velocities were calculated for different initial temperatures of incoming gas using the equations of Semenov, Frank-Kamenetsky et al and of Tanford and Pease. (Author)
AD-658 154 HC$3.00 MF$0.65

BURNING VELOCITY, EFFECT OF MOLECULAR STRUCTURE,
Texaco Experiment Inc Richmond Va
H. F. Calcote, and C. J. Gibbs. 1Jul 53, 56p Rept no. TM-641
Contract NOrd-9756
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2263.

Descriptors: (*Burning rate, *Molecular structure), Flames, Analysis, Fuels, Experimental data.

A simple and reliable method was worked out for calculating burning velocity from flame dimensions. The report presents the procedure, with data demonstrating the errors involved, a comparison with results from other laboratories, and the burning velocities of seventy-seven compounds showing the effect of molecular structure on burning velocity.
AD-658 335 HC$3.00 MF$0.65

CARBON DISULFIDE FLAMES, INFLUENCE OF MOISTURE,
Texaco Experiment Inc Richmond Va
C. J. Gibbs, I. R. King, and H. F. Calcote. 1 May 54, 28p Rept no. TM-642
Contract NOrd-9756
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2264.

Descriptors: (*Sulfides, *Burning rate), (*Carbon compounds, *Flames), Moisture, Concentration (Chemistry), Flame propagation, Ignition, Quenching (Inhibition), Chemical reactions, Combustion products.
Identifiers: Carbon disulfide.

The burning velocity of carbon disulfide - air flames increases exponentially as the concentration of water is reduced so that on a Bunsen burner for very dry mixtures flash back was inescapable. Flame propagation in a 1.5-inch closed tube increased from 550 for a water-saturated to 1150 cm/sec for a very dry mixture. The minimum spark-ignition energy and quenching distance also were markedly affected by the moisture content. Both a diffusional transfer and a thermal transfer theory are marginal in explaining the results. However, it appears more reasonable that hydrogen atoms or hydrogen-containing species from water inhibit the reaction chain. (Author)
AD-658 336 HC$3.00 MF$0.65

QUALITATIVE ANALYSIS OF INCENDIARY MATERIALS ORIGINATING WITH TEMPERATURE AND RADIATION MEASUREMENTS.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 13L.
For abstract, see STAR 05 20.
N67-34349 HC$3.00 MF$0.65

SOLUTION OF THE BLASIUS BOUNDARY LAYER EQUATION BEHIND A SHOCK WITH VAPORIZATION AND COMBUSTION AT THE WALL.
Michigan Univ., Ann Arbor. Gas Dynamics Labs.
K. W. Ragland. Jul 67, 61p NASA-CR-72235
Contract NASR-54/07/

Descriptors: *Blasius equation, *Boundary layer combustion, *Normal shock wave, *Vaporization, Analog, Boundary, Coefficient, Combination, Combustion, Computer, Drag, Flat, Gas, Heat transfer, Layer, Mach number, Mass, Material, Normal, Range, Shock, Solution, Tabulation, Transfer, Wall, Wave.

For abstract, see STAR 05 20.
N67-34546 HC$3.00 MF$0.65

AXIAL MODE SHOCK WAVE COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET ENGINES.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 20.
N67-34600 HC$3.00 MF$0.65

EVALUATION OF SPEECH SUPPRESSION CONCEPTS IN A 20,000 POUND THRUST HYDROGEN OXYGEN ROCKET.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
N. P. Hannum, L. M. Russell, and J. P. Wanhainen. Aug 67, 36p NASA-TM-X-1435

Descriptors: *Acoustic stability, *Hydrox engine, *Noise suppressor, Acoustic, Additive, Chamber, Characteristics, Cooling, Distribution, Engine, Face, Film, Fluorine, Hydrox, Injection, Liquid, Noise, Nozzle, Oxidizer, Plate, Porosity, Pressure, Propellant, Radial, Stability, Suppression, Suppressor, Temperature, Tube, Wall.

For abstract, see STAR 05 20.
N67-34758 HC$3.00 MF$0.65

NONLINEAR ASPECTS OF COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS STATUS REPORT, 1 JUN. 1966 - 31 MAY 1967.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 20.
N67-35122 HC$3.00 MF$0.65

SIGNIFICANCE OF CHARCOAL IGNITION TEMPERATURES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 21D.
For abstract, see NSA 21 18.
ORNL-4129 HC$3.00 MF$0.65

PROPELLANT VAPORIZATION AS A DESIGN CRITERION FOR ROCKET-ENGINE COMBUSTION CHAMBERS.
National Aeronautics and Space Administration. Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 21H.
PB-175 737 HC$3.00 MF$0.65

21C. Electric Propulsion

IONIZING LAYERS IN THE PLASMA PROPULSION DEVICES,
General Dynamics/Convair San Diego Calif Space Science Lab
J. Rosciszewski. 1965, 12p
AFOSR-67-2068
Contract AF 49 (638)-1556
Availability: Published in Proceedings of the International Symposium on Space Technology and Science (6th), Tokyo (Japan), p211-18 1965.

Descriptors: (*Plasma engines, Ionization), Energy, Excitation, Propulsion, Ionic current, Electric discharges, Hall effect, Plasma accelerators.

The following topics are examined: The radiation and ionization energy losses, the energy losses due to wall bombardment by ions and the ion current, magnetic piston discharge layer, rarefaction type of discharge layer, and the equations of the Hall current accelerator. (Author)
AD-657 887 Not available from CFSTI.

EVALUATION OF AN ION PROPULSION SYSTEM FOR A SYNCHRONOUS SPACECRAFT MISSION.
National Aeronautics and Space Administration. Goddard Space Flight Center. Greenbelt, Md.
R. O. Bartlett, K. I. Duck, and R. J. Sullivan. Aug 67, 14p NASA-TM-X-55874, X-734-67-382
Presented At the Aiaa Elec. Propulsion and Plasmadyn. Conf., Colorado Springs, 11-13 Sep. 1967

Descriptors: *Attitude control, *Ion engine, *Propulsion system, *Stationkeeping, *Synchronous satellite, Actuator, Attitude, Computer, Control, Gradient, Gravity, Hybrid, Lunar, Perturbation, Pressure, Propulsion, Radiation, Satellite, Simulation, Solar, Synchronous, System, Thrust.

For abstract, see STAR 05 20.
N67-34242 HC$3.00 MF$0.65

ON THE APPLICATION OF ELECTRIC PROPULSION TO SATELLITE ORBIT ADJUSTMENT AND STATION KEEPING.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
C. C. Barrett. Aug 67, 15p NASA-TM-X-55880, X-734-67-400
Presented At the Aiaa Elec. Propulsion and Plasmadyn. Conf., Colorado Springs, Colo., 11-13 Sep. 1967

Descriptors: *Attitude control, *Electric propulsion, *Satellite orbit, *Stationkeeping, *Synchronous satellite, Adjustment, Attitude, Communications, Control, Earth, Electric, Meteorology, Module, Orbit, Propulsion, Resistojet, Satellite, Sun, Synchronous, System, Thrustor.

For abstract, see STAR 05 20.
N67-34300 HC$3.00 MF$0.65

HIGH-TEMPERATURE LIQUID-MERCURY CATHODES FOR ION THRUSTERS QUARTERLY PROGRESS REPORT, 1 DEC. 1966 - 28 FEB. 1967.
Hughes Research Labs., Malibu, Calif.
K. W. Arnold, W. O. Eckhardt, G. Hagen, R. C. Knechtli, and J. A. Snyder. 28 Feb 67, 61p
NASA-CR-87500, QPR-3
Contract NASW-1404

Descriptors: *Electron bombardment, *High temperature fluid, *Mercury (metal), *Thermionic cathode, Analysis, Bombardment, Cathode, Design, Discharge, Electron, Fluid, Geometry, High temperature, Liquid, Mercury, Metal, Parameter, Testing, Thermionic, Thrust.

For abstract, see STAR 05 20.
N67-34988 HC$3.00 MF$0.65

DESIGN AND PERFORMANCE OF A THERMAL STORAGE RESISTOJET.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. A. Cygnarowicz, and R. N. Gibson, Jr., Aug 67, 13p NASA-TM-X-55884, X-736-67-388
Presented At the Aiaa Elec. Propulsion and Plasmadyn. Conf., Colorado Springs, 11-13 Sep. 1967

Descriptors: *Mechanical system, *Resistojet engine, Ammonia, Application, Electric, Engine, Environment, Heat, Mechanical, Performance, Power, Propellant, Resistojet, Satellite, Shield, Storage, System, Testing, Thermal, Thrustor.

For abstract, see STAR 05 20.
N67-35008 HC$3.00 MF$0.65

FAST INTERPLANETARY MISSIONS WITH LOW-THRUST PROPULSION SYSTEMS.
National Aeronautics and Space Administration. Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 22C.
PB-175 735 HC$3.00 MF$0.65

TRAJECTORIES WITH CONSTANT TANGENTIAL THRUST IN CENTRAL GRAVITATIONAL FIELDS.
National Aeronautics and Space Administration. Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 22C.
PB-175 736 HC$3.00 MF$0.65

21D. Fuels

PERFORMANCE OF AMMONIA-FIRED GAS-TURBINE COMBUSTORS.
California Univ Berkeley Thermal Systems Div
For primary bibliographic entry see Field 21E.
AD-657 585 HC$3.00 MF$0.65

SIGNIFICANCE OF CHARCOAL IGNITION TEMPERATURES,
Oak Ridge National Lab., Tenn.
R. J. Davis. Jul 67, 21p
Contract W-7405-eng-26

Descriptors: (*Charcoal, *Ignition), (*Heat of activation, *Surface temperatures), Convection (Heat transfer), Chemical reactions.

For abstract, see NSA 21 18.
ORNL-4129 HC$3.00 MF$0.65

THE POTENTIAL MARKET FOR MIDWESTERN AND ALASKAN COAL AND LIGNITE.
Nathan (Robert R.) Associates, Inc., Washington, D. C.
For primary bibliographic entry see Field 5C.
PB-175 738 HC$3.00 MF$0.65

21E. Jet and Gas Turbine Engines

PERFORMANCE OF AMMONIA-FIRED GAS-TURBINE COMBUSTORS.
Technical rept.,
California Univ Berkeley Thermal Systems Div
D. T. Pratt. Aug. 67, 35p Rept no. TR-9, TS-67-5
Contract DA-04-200-AMC-791 (x)

Descriptors: (*Gas turbines, Fuels), (*Ammonia, Combustion), (*Combustion chambers, Scale), Performance (Engineering), Reaction kinetics, Gas flow, Diffusion, Reynolds number, Fuel nozzles.

A theoretical and experimental program was undertaken to investigate scaling and combustion in gaseous ammonia-fired gas turbine combustors. Theoretical analysis of performance and scale test data previously performed strongly indicates that the final size chosen for an operating gas turbine is performance-limited almost equally by chemical reaction kinetics (residence time) and by turbulent diffusion or mixing processes (velocity or Reynolds number). Experimental results confirmed that a small-diameter combustor is chemically rate-limited at pressures very slightly less than the minimum previously reported, and becomes limited almost equally by chemistry and mixing at higher pressures. The fundamental problem with utilizing gaseous ammonia as a turbine fuel is certainly the relatively slow (compared to hydrocarbon fuels) chemical reaction between ammonia and air. As air flow is reduced, to allow sufficient residence time for the reaction to progress, diminished Reynolds number effects lead to less efficient mixing. This in turn leads to decreased combustion efficiency. The only apparent solutions (apart from chemical enrichment by cracking or use of additives) are to use a smaller fuel nozzle orifice to create a more vigorous fuel jet in the primary zone, and to use two or more combustors in parallel rather than build a single larger combustor.
AD-657 585 HC$3.00 MF$0.65

DIGITAL CONTROL OF A NAVAL STEAM-GENERATING SYSTEM.
Navy Electronics Lab San Diego Calif
For primary bibliographic entry see Field 13J.
AD-657 846 HC$3.00 MF$0.65

X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. VOLUME I.
General Electric Co Cincinnati Ohio Flight Propulsion Lab Dept
For primary bibliographic entry see Field 1C.
AD-657 992 HC$3.00 MF$0.65

PHYSICAL PRINCIPLES OF THE WORKING PROCESS IN COMBUSTION CHAMBERS OF JET ENGINES,
Foreign Technology Div Wright-Patterson AFB Ohio
B. V. Raushenbakh, S. A. Belyi, I. V. Bespalov, V. Ya. Borodachev, and M. S. Volynskii. 2 May 67, 503p Rept no. FTD-MT-65-78
TT-67-62866
Edited machine trans. of mono. Fizicheskie Osnovy Rabochego Protsessa v Kamerakh Sgoraniya Vozdushno-Reaktivnykh Dvigatelei, Moscow, 1964 p1-526.

Descriptors: (*Jet engines, Combustion chambers), (*Combustion chambers, Operation), Turbojet engines, Ramjet engines, Thermodynamic cycles, Combustion, Combustion products, Fuel injection, Fuel sprays, Ignition, Burning rate, Gas flow, Turbulence, Vibration, Flames, Stabilization, Blunt bodies, Wake, Cooling, Heat transfer.

The book deals with the physical principles of fuel combustion processes in air flows and methods of calculation of combustion chambers of jet engines. Consideration zs given to thermodynamic and aerodynamic characteristics of combustion chambers, processes of atomization and carbure-

tion of fuels, ignition and combustion of gas mixtures in laminar and turbulent flows, methods of flame stabilization, vibrational combustion, combustion in the wake behind a bluff body, processes of heat exchange and thermal protection of chambers. (Author)
AD-658 372 HC$3.00 MF$0.65

APPLICATION OF BLUNT TRAILING EDGE BLADINGS TO SUPERSONIC COMPRESSOR STAGES FINAL SCIENTIFIC REPORT, 30 APR. 1966 - 1 MAY 1967.
Von Karman Inst. for Fluid Dynamics, Rhode Saint-genese (Belgium).
F. Breugelmans, and J. Chauvin. May 67, 73p
ARL-67-0120, AD-653595
Contract AF-EOAR-65-65
Its Nota Interna No. 22

Descriptors: *Blunt body, *Compressor blade, *Supersonic compressor, *Trailing edge, Axial, Blade, Blunt, Body, Cascade, Compressor, Edge, Flow, Rotor, Stator, Structure, Subsonic, Supersonic, Trailing, Transonic.

For abstract, see STAR 05 20.
N67-34249 HC$3.00 MF$0.65

EXPERIMENTS CONCERNING THE EFFECT OF TRAILING- EDGE THICKNESS ON BLADE LOSS AND TURBINE STAGE EFFICIENCY.
Gt. Brit. Ministry of Aviation, London. Aeronautical Research Council.
D. C. Dransfield, D. J. Fullbrook, and I. H. Johnson. 1967, 22p ARC-R+M-3459, NGTE-R-264

Descriptors: *Trailing edge, *Turbine, *Turbine blade, Blade, Cascade, Coefficient, Edge, Efficiency, Loss, Rotor, Stage, Stator, Thickness, Trailing, Tunnel.

For abstract, see STAR 05 20.
N67-34969 HC$3.00 MF$0.65

FACTORS THAT AFFECT OPERATIONAL RELIABILITY OF TURBOJET ENGINES.
Technical rept.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
1960, 214p NASA-TR-R-54
N62-70478

Descriptors: (*Turbojet engines, *Reliability), Malfunctions, Performance (Engineering), Fuel pumps, Fuel systems, Control systems, Operation, Failure (Mechanics), Aviation safety, Probability, Maintenance.

The problem of improving operational reliability of turbojet engines is studied. Failure statistics for this engine are presented, the theory and experimental evidence on how engine failures occur are described, and the methods available for avoiding failure in operation are discussed. (Author)
PB-175 852 HC$3.00 MF$0.65

21F. Nuclear Propulsion

CRITICAL EXAMINATION OF THE PULSEJET.
Studio Critico Del Pulsoreattore
Italy. Ministero Difesa Aeronautica, Rome.
R. Pallabazzer. 1966, 25p REPT.-27
in Italian, English Summary

Descriptors: *Propulsion system, *Pulse jet engine, *Thermodynamics, Afterburner, Engine, Exhaust, Geometry, Jet, Propulsion, Pulse, Rocket, Spacecraft, System.

For abstract, see STAR 05 20.
N67-35249 HC$3.00 MF$0.65

FAST INTERPLANETARY MISSIONS WITH LOW-THRUST PROPULSION SYSTEMS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 22C.
PB-175 735 HC$3.00 MF$0.65

21H. Rocket Motors and Engines

AXIAL MODE SHOCK WAVE COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET ENGINES.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
C. E. Mitchell. Jul 67, 203p NASA-CR-72259, AMS-TR-798
Contract NASR-217, Grant NSG-99-60

Descriptors: *Combustion instability, *Liquid propellant rocket engine, *Shock wave, Amplitude, Axial, Combustion, Crocco method, Differential, Equation, Frequency, Instability, Liquid, Mode, Model, Oscillation, Pressure, Propellant, Rocket engine, Shock, Velocity, Wave.

For abstract, see STAR 05 20.
N67-34600 HC$3.00 MF$0.65

EVALUATION OF SPEECH SUPPRESSION CONCEPTS IN A 20,000 POUND THRUST HYDROGEN OXYGEN ROCKET.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 20.
N67-34758 HC$3.00 MF$0.65

NONLINEAR ASPECTS OF COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS STATUS REPORT, 1 JUN. 1966 - 31 MAY 1967.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
G. R. Black, F. V. Bracco, L. Crocco, D. T. Harrje, and C. E. Mitchell. Jun 67, 155p NASA-CR-72270, AMS-SR-553-G
Contract NASR-217

Descriptors: *Combustion instability, *Liquid propellant rocket engine, *Nonlinearity, *Propellant combustion, Acoustic, Combustion, Damping, Device, Drop, Effect, Energy, Engine, Exhaust, Instability, Liner, Liquid, Nozzle, Oscillation, Propellant, Rocket, Shock, Source, Wave.

For abstract, see STAR 05 20.
N67-35122 HC$3.00 MF$0.65

DESIGN AND DEMONSTRATION OF A RADIOISOJET.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. C. Isley, and R. Viventi, Jr.. Aug 67, 10p
NASA-TM-X-55883, X-734-67-379
Presented At the Aiaa 3d Propulsion Joint Specialist Conf., Washington, D. C., 17-21 Jul. 1967

Descriptors: *Jet thrust, *Radioactive isotope, *Thrustor, Ammonia, Application, Capsule, Flow, Heat, Isotope, Jet, Mass, Measurement, Oxide, Propellant, Radioactivity, Spacecraft, Temperature, Thrust, Transient.

For abstract, see STAR 05 20.
N67-35190 HC$3.00 MF$0.65

PROPELLANT VAPORIZATION AS A DESIGN CRITERION FOR ROCKET-ENGINE COMBUSTION CHAMBERS.
Technical rept.,
National Aeronautics and Space Administration. Cleveland, Ohio. Lewis Research Center.
Richard J. Priem, and Marcus F. Heidmann. 1960, 60p NASA-TR-R-67
N62-70491

Descriptors: (*Liquid rocket propellants, Vaporization), (*Cryogenic propellants, Vaporization), (*Combustion chambers, Design), Rocket motors (Liquid propellant), Combustion, Theory, Reaction kinetics, Fuel sprays, Particle size, Injectors, Alkanes, Ammonia, Hydrazine, Oxygen, Fluorine, Fuel nozzles.

A model and theory for describing the rocket combustion process are presented. The model is based on the assumption that propellant vaporization is the rate-controlling combustion process. Calculations of the vaporization rate and histories show the effects of propellants, spray conditions, engine design parameters, and operating parameters on the vaporization process. The results are correlated with an effective chamber length for ease in using them for design purposes. An analysis is presented of the quantitative effect of incomplete propellant vaporization on combustor performance. With this analysis, experimental and calculated combustor performances are compared for injectors where drop size can be calculated. For other injectors the drop sizes are deduced and are shown as functions of injector type and orifice size. The technique for using the calculated results to design rocket combustors is also described. (Author)
PB-175 737 HC$3.00 MF$0.65

21I. Rocket Propellants

INVESTIGATION OF THE MECHANISMS OF DECOMPOSITION, COMBUSTION, AND DETONATION OF SOLIDS.
Aerojet-General Corp., Azusa, Calif.
For primary bibliographic entry see Field 21B.
AD-413 100 HC$3.00

INVESTIGATION OF THE MECHANISMS OF DECOMPOSITION, COMBUSTION, AND DETONATION OF SOLIDS.
Aerojet-General Corp., Azusa, Calif.
For primary bibliographic entry see Field 21B.
AD-442 487 HC$3.00

PREDICTION OF DETONATION HAZARD IN SOLID PROPELLANTS.
Picatinny Arsenal Dover N J
For primary bibliographic entry see Field 19A.
AD-657 605 HC$3.00 MF$0.65

REACTIONS OF DIFLUORAMINE WITH LEWIS ACIDS,
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 7B.
AD-657 650 Not available from CFSTI.

THE DEFLAGRATION OF HYDRAZINE DIPERCHLORATE.
Revised ed.,
Atlantic Research Corp Alexandria Va Kinetics and Combustion Group
E. T. McHale, S. J. Adams, G. von Elbe, and J. B. Levy. Aug 66, 12p
AFOSR-67-1999
Contract AF 49 (638)-1169
Revision of manuscript submitted May 1966.
Availability: Published in Combust Flame v11 n2 p141-9 Apr 1967.

Descriptors: (*Hydrazine derivatives, *Deflagration), (*Solid rocket oxidizers, Deflagration), Pressure, Catalysts, Flames, Temperature, Quenching (Inhibition), Pyrolysis, Combustion.
Identifiers: Hydrazine perchlorate.

Experimental studies encompassing the following aspects of the self-deflagration of the solid oxidizer

hydrazine diperchlorate were carried out: deflagration rate as a function of pressure and the effects of catalysts; flame temperature and temperature profile through the combustion wave; thermal decomposition and quenching of the deflagration. The results suggest that the deflagration process is defined by three pressure regimes: a low-pressure regime, below approximately 20 atm; a high-pressure regime, above approximately 100 atm; and a region of transition. At high pressure, 'normal' deflagration occurs, i.e. a flame is stabilized above the oxidizer, heat from this exothermic reaction zone is transmitted back to the condensed material causing gasification. Reactants enter the flame and thus continue the cycle. At pressures below 20 atm, the oxidizer is mainly consumed by a rapid, self-sustaining decomposition. Condensed-phase chemical reactions are the primary mode of combustion and heat transfer from a stable flame makes a secondary contribution to the process. (Author)

AD-657 728 Not available from CFSTI.

RESPONSE OF A BURNING PROPELLANT SURFACE TO EROSIVE TRANSIENTS.

Quarterly rept. no. 6, 1 Apr-30 Jun 67,
Stanford Research Inst Menlo Park Calif
G. A. Marxman, C. E. Wooldridge, and E. L. Capener. 22 Aug 67, 33p
AFOSR-67-1778
Contract AF 49 (638)-1665
See also AD-638 629.

Descriptors: (*Solid rocket propellants, *Combustion), Ignition, Fiber optics, High-speed photography, Computers, Ammonium perchlorate, Crystals, Aluminum, Theory, Pressure.

The report covers the research progress on combustion instability characteristics of solid propellants accomplished under Contract AF 49 (638)-1665, during the period 1 April through 30 June 1967. During this quarter the analytical model of transient solid propellant combustion has been modified to account for a decrease in gas-phase heat release whenever there is an increase in surface-coupled heat release, and vice versa. The computer analysis has been changed to reflect this modification. Correlation of the numerically predicted behavior with the experimental results obtained previously from traveling wave studies will allow the determination of those factors that are most influential in determining the burning rate response to sudden pressure changes. Experimental studies of the detailed structure of the fl me zone, using fiber optics in conjunction with high-speed photography, have shown that both ammonium perchlorate crystals and aluminum particles may ignite at or near the surface, providing further support for the concept of surface-coupled heat release. (Author)

AD-657 762 HC$3.00 MF$0.65

ENERGY OF COMBUSTION AND DIFFERENTIAL THERMOGRAMS OF ORGANIC AZIDES,

Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 7D.
AD-657 768 HC$3.00 MF$0.65

IGNITION AND COMBUSTION OF SOLID PROPELLANTS.

Final rept. 1 Oct 65-30 Sep 66,
Utah Univ Salt Lake City Dept of Chemical Engineering
Robert G. Mantyla, Jih-tien Cheng, Larry S. Bouck, John A. Keller, and Alva D. Baer. 30 Sep 66, 111p
AFOSR-67-1901
Grant AF-AFOSR-40-66

Descriptors: (*Solid rocket propellants, *Combustion), (*Ignition, Solid rocket propellants), Heat transfer, Burning rate, Ignition lag, Pressure, Test equipment, Composite propellants, Solid rocket propellant binders, Solid rocket oxidizers, Ammonium perchlorate, Combustion products, Pyrolysis.

A model for the ignition response of solid propellants is presented, which predicts ignition behavior with respect to pressure and surface heat flux in qualitative agreement with experimental measurements. Surface regression is treated and a steady-state burning model is employed, which assumes equilibrium vaporization at the surface and a regression rate limited by the feedback flux. A method is developed and discussed for the determination of the net heat of gasification of a burning propellant. The critical pressure ratio for extinction by instantaneous depressurization, which is required for this method, is obtained by use of a rarefaction tube. Summaries are presented of a study of the PBAA and PBAA-AP decomposition reactions and of the results of measurement of propellant surface temperature during the ignition transient by detection of infrared emission from the surface. (Author)

AD-657 781 HC$3.00 MF$0.65

ON LIQUID DROPLET COMBUSTION AT HIGH PRESSURES.

Aerochem Research Labs Inc Princeton N J
For primary bibliographic entry see Field 21B.
AD-657 890 Not available from CFSTI.

NON-STEADY BURNING PHENOMENA OF SOLID PROPELLANTS: THEORY AND EXPERIMENT.

Rept. for 1 Oct 65-30 Sep 66,
Princeton Univ N J Dept of Aerospace and Mechanical Sciences
M. Summerfield, H. Krier, J. S. T'ien, and W. A. Sirignano. Jul 67, 95p Rept no. 793
AFOSR-67-1535
Contract AF 49 (638)-1405

Descriptors: (*Solid rocket propellants, *Combustion), Stability, Burning rate, Flames, Temperature, Pressure, Oscillation, Acoustics, Entropy.

Non-steady burning of solid propellants was investigated both theoretically and experimentally, with attention to combustion instability, transient burning during motor ignition, and extinction by depressurization. The theory is based on a one-dimensional model of the combustion zone consisting of a thin gaseous fl me and a solid heat up zone. The non-steady gaseous flame behavior is deduced from experimental steady burning characteristics; the response of the solid phase is described by the time-dependent Fourier equation. Solutions were obtained for dynamic burning rate, flame temperature, and burnt gas entropy under different pressure variations; two methods were employed. First, the equations were linearized and solved by standard techniques. Then, to observe nonlinear effects, solutions were obtained by digital computer for prescribed pressure variations. One significant result is that a propellant with a large heat evolution at the surface is intrinsically unstable under dynamic conditions even though a steady-state solution exists. Another interesting result is that the gas entropy amplitude and phase depend critically on the frequency of pressure oscillation and that either near-isentropic or near-isothermal oscillations may be observable. Experiments with an oscillating combustion chamber and with a special combustor equipped for sudden pressurization tend to support the latter conclusion. (Author)

AD-658 049 HC$3.00 MF$0.65

RELAXATION PROPERTIES OF POLYESTER BASED ON POLYURETHANE UNDER SMALL DEFORMATIONS SUPERPOSED ON LARGE DEFORMATIONS,

Polytechnic Inst of Brooklyn N Y
For primary bibliographic entry see Field 20K.
AD-658 328 HC$3.00 MF$0.65

HANDBOOK OF PHYSICAL AND THERMAL PROPERTY DATA FOR HYDROGEN. TRIPLE POINT REGION TO CRITICAL POINT REGION. VOLUME I - A STUDY OF HYDROGEN SLUSH AND/OR HYDROGEN GEL UTILIZATION.

Lockheed Missiles and Space Co., Sunnyvale, Calif.
11 Mar 67, 72p NASA-CR-87655, LMSC-K-11-67-1, VOL. I
Contract NAS8-20342

Descriptors: *Handbook, *Hydrogen fuel, *Physical property, *Slush, *Thermal property, Critical, Cryogenic, Cryogenics, Design, Equilibrium, Fuel, Gel, Hydrogen, Mixture, Physical, Point, Property, Space vehicle, Thermal, Triple.

For abstract, see STAR 05 20.
N67-34912 HC$3.00 MF$0.65

A STUDY OF ENERGY RELEASE IN ROCKET PROPELLANTS BY A PROJECTILE IMPACT METHOD ANNUAL REPORT, 9 MAY 1966 - 9 MAY 1967.

Atlantic Research Corp., Alexandria, Va. Research Div.
R. L. Durfee, and A. Macek. 9 Jun 67, 33p
NASA-CR-66395, AR-1
Contract NAS1-6200

Descriptors: *Energy, *Impact test, *Shock wave, *Solid propellant, Ammonium, Amplitude, Duration, Granule, High velocity, Measurement, Method, Nondestructive, Perchlorate, Polyethylene, Powder, Projectile, Propellant, Reaction, Recovery, Release, Shock, Solid, Wave.

For abstract, see STAR 05 20.
N67-35223 HC$3.00 MF$0.65

PROPELLANT VAPORIZATION AS A DESIGN CRITERION FOR ROCKET-ENGINE COMBUSTION CHAMBERS.

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 21H.
PB-175 737 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

22A. Astronautics

ACTIVE DAMPING CONCEPT FOR GRAVITY GRADIENT SATELLITE ATTITUDE CONTROL,

Aerospace Corp El Segundo Calif El Segundo Technical Operations
For primary bibliographic entry see Field 22B.
AD-657 764 HC$3.00 MF$0.65

LMSC PUBLISHED CONTRIBUTIONS, 1966 IMPRINTS: A CITATION BIBLIOGRAPHY,

Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 5B.
AD-658 396 HC$3.00 MF$0.65

SCIENTIFIC MISSION SUPPORT FOR EXTENDED LUNAR EXPLORATION. VOLUME 1 - CONDENSED SUMMARY FINAL REPORT.

North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
Dec 66, 38p NASA-CR-87399, SID-66-957-1
Contract NAS8-20258

Descriptors: *Apollo project, *Astronaut training, *Data handling system, *Lunar exploration, *Operations research, *Support system, *Systems design, Astronaut, Control, Data, Design, Earth, Equipment, Experiment, Exploration, Handling, Life, Lunar, Mission, Operation, Planning, Requirement, Research, Resource, Science, Support, System, Training.

For abstract, see STAR 05 20.
N67-34087 HC$3.00 MF$0.65

MOTION OF A SPACECRAFT NEAR A TRIANGULAR LIBRATION POINT OF THE EARTH- MOON SYSTEM.
Texas Univ., Austin.
B. E. Schutz. Jan 66, 194p NASA-CR-65677, TCR-6
Contract NAS9-2619

Descriptors: *Earth-moon system, *Librational motion, *Spacecraft motion, Barycenter, Circular, Earth, Ephemeris, Libration, Mathematics, Model, Moon, Motion, Orbit, Point, Spacecraft, System, Triangle.

For abstract, see STAR 05 20.
N67-34670 HC$3.00 MF$0.65

MISSION ORIENTED STUDY OF ADVANCED NUCLEAR SYSTEM PARAMETERS, PHASE IV, VOLUME III FINAL REPORT, MAY 1965 - DEC. 1966.
TRW Systems, Redondo Beach, Calif.
A. R. Chovit, and L. D. Simmons. Dec 66, 35p NASA-CR-87487, TRW-01977-6007-R000, VOL. 3
Contract NAS8-5371

Descriptors: *Abort, *Manned space flight, *Mars spacecraft, *Mission planning, Analysis, Azimuth, Conjunction, Constraint, Flyby, Launch, Manned, Mars, Mission, Nuclear, Opposition, Parameter, Performance, Planning, Space flight, Spacecraft, System, Window.

For abstract, see STAR 05 20.
N67-34685 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-45, VOLUME IV FOR THE PERIOD APRIL 1, 1967 TO MAY 31, 1967. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Jun 67, 363p NASA-CR-87450, JPL-SPS-37-45, VOL. IV
Contract NAS7-100

Descriptors: *Environment simulation, *Guidance and control, *Propulsion, *Space exploration, *Telecommunication, Analysis, Computation, Engineering, Environment, Exploration, Lunar, Mechanics, Physics, Planetary, Polymer, Power, Simulation, Space, Spacecraft, System.

For abstract, see STAR 05 20.
N67-34761 HC$3.00 MF$0.65

MISSION ORIENTED STUDY OF ADVANCED NUCLEAR SYSTEM PARAMETERS, PHASE IV, VOLUME II FINAL REPORT, MAY 1965 - DEC. 1966.
TRW Systems, Redondo Beach, Calif.
A. R. Chovit, and L. D. Simmons. Dec 66, 142p NASA-CR-87488, TRW-01977-6005-R000, VOL. 2
Contract NAS8-5371

Descriptors: *Manned space flight, *Mars (planet), *Mission planning, *Trajectory analysis, Abort, Analysis, Conjunction, Earth, Launch, Manned, Mission, Nuclear, Parameter, Planning, Space flight, Stop, Swing, System, Trajectory, Vehicle, Venus, Window.

For abstract, see STAR 05 20.
N67-34792 HC$3.00 MF$0.65

MISSION ORIENTED STUDY OF ADVANCED NUCLEAR SYSTEM PARAMETERS, PHASE IV, VOLUME I FINAL REPORT, MAY 1965 - DEC. 1966.
TRW Systems, Redondo Beach, Calif.
A. R. Chovit, and L. D. Simmons. Dec 66, 63p NASA-CR-87489, TRW-01977-6005-R000, VOL. 1
Contract NAS8-5371

Descriptors: *Manned space flight, *Mars (planet), *Mission planning, Abort, Analysis, Conjunction, Earth, Launch, Nuclear, Parameter, Stop, Swing, System, Window.

For abstract, see STAR 05 20.
N67-34793 HC$3.00 MF$0.65

THE MICROBIAL PROFILE OF A VERTICAL LAMINAR AIRFLOW SURGICAL THEATER.
Sandia Corp., Albuquerque, N. Mex.
For primary bibliographic entry see Field 6M.
For abstract, see STAR 05 20.
N67-34949 HC$3.00 MF$0.65

MULTIDISCIPLINARY RESEARCH LEADING TO UTILIZATION OF EXTRATERRESTRIAL RESOURCES ANNUAL STATUS REPORT, FISCAL YEAR 1967.
Bureau of Mines, Minneapolis, Minn. Twin Cities Mining Research Center.
1967, 74p NASA-CR-88161
NASA-ORDER R-09-040-001

Descriptors: *Lunar soil, *Lunar surface, *Physical property, *Rock, Analysis, Apollo project, Data, Drill, Engineering, Experiment, Exploration, Literature, Lunar, Material, Ogo, Physical, Probe, Property, Soil, Surface, Survey.

For abstract, see STAR 05 20.
N67-35071 HC$3.00 MF$0.65

ANALYTICAL STUDY OF SOFT LANDINGS ON GAS-FILLED BAGS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 1B.
PB-175 875 HC$3.00 MF$0.65

A STUDY OF THE POSITIONS AND VELOCITIES OF A SPACE STATION AND A FERRY VEHICLE DURING RENDEZVOUS AND RETURN.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
John M. Eggleston, and Harold D. Beck. 1961, 43p NASA-TR-R-87
AD-248 770

Descriptors: (*Space stations, *Spacecraft docking), (*Rendezvous spacecraft, Trajectories), Equations of motion, Circular orbit trajectories, Elliptical orbit trajectories, Costs, Velocity, Mathematical analysis.

A study is made of the families of nonthrusting ascent trajectories of a ferry vehicle during rendezvous with an orbiting body, referred to as a space station. It is shown that these trajectories may also be interpreted as descent trajectories of the ferry from the station to the earth. The rendezvous trajectories start at the end of the boost period (assumed to be 60 miles) and terminate at the station. The equations of motion are derived and results are shown for two typical orbits of the station: a 300-mile circular orbit and a 100- to 500-mile elliptical orbit. Trajectories are described in terms of a rotating coordinate system fixed in the station and launch conditions are tabulated in terms of nonrotating inertial coordinates. Boundaries are given in terms of launch (at time of booster burnout) and rendezvous conditions for the example cases. The considerations used to calculate these boundaries and the significance of some of the trends are discussed. (Author)
PB-175 892 HC$3.00 MF$0.65

22B. Spacecraft

PROBLEMS WITH ELECTRICAL CONNECTORS AND INSULATED WIRE IN THE AEROSPACE INDUSTRY,
General Electric Co., Daytona Beach, Fla. Apollo Support Dept.
For primary bibliographic entry see Field 9A.
AD-479 566 HC$3.00 MF$0.65

FLAMMABILITY OF SPACECRAFT WIRE IN AN OXYGEN ATMOSPHERE,
General Electric Co., Schenectady, N. Y. Research and Development Center.
K. N. Mathes, and L. J. Frisco. 8 Oct 65, 17p
Annual Wire and Cable Symposium, Atlantic City, N. J. December 1-3, 1965.

Descriptors: (*Electric wire, *Flammability), (*Manned spacecraft, Electric wire), Wire, Closed ecological systems, Combustion, Environmental tests, Oxygen, Electric cables, Standards, Mechanical properties, Physical properties, Halocarbon plastics, Polyamide plastics, Silicone plastics, Electric insulation, Test methods, Spacecraft cabins, Polymers, Hazards.

An oxygen atmosphere presents a definite flammability hazard with hook-up wire. No recommendations are made here for final selection of specific wires for specific application because each wire has advantages and limitations. Although flammability by itself may not be in every case the deciding factor, silicone rubber and polyolefin are so flammable that they appear to have limited usefulness, at least in an oxygen atmosphere.
AD-479 568 HC$3.00 MF$0.65

AN AUTOMATIC ATTITUDE CONTROL SYSTEM FOR A SPINNING SATELLITE: A THEORETICAL ASSESSMENT.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
A. J. Sarnecki. Nov 66, 18p Rept no. RAE-TR-66368

Descriptors: (*Attitude control systems, Satellites (Artificial)), Great Britain, Automatic, Spin, Jets, Theory.

The Report describes a method by which a spinning satellite may maintain its spin axis normal to the orbit without the need for a ground-to-satellite command link. The proposed control system uses earth sensors, on-board logic and a jet system to provide the control torques. The Report could form the basis of an engineering design of a system capable of accuracy within a fraction of a degree. (Author)
AD-657 680 HC$3.00 MF$0.65

ACTIVE DAMPING CONCEPT FOR GRAVITY GRADIENT SATELLITE ATTITUDE CONTROL,
Aerospace Corp El Segundo Calif El Segundo Technical Operations
Alfred S. Gutman. Jul 67, 16p Rept no. TR-1001 (2525-05)-2
SAMSO-TR-67-1
Contract AF 04 (695)-1001

Descriptors: (*Satellite attitude, *Control), Satellites (Artificial), Gravity, Damping, Stabilization systems, Rods, Torque, Servo amplifiers, Oscillation, Errors, Actuators, Electromagnetic properties.

The report describes a concept for a satellite gravity gradient stabilization system. It utilizes active damping to reduce the oscillation time constant

and the initial capture time and also to reduce the oscillation magnitude (amplitude). The active damper described is conceptually capable of achieving high reliability. It consists of an elastically suspended control rod driven by an electromagnetic actuator; the actuator is excited by a servo amplifier which is controlled by an optical sensor. This attitude control concept may be implemented to provide automatic correction of errors caused by bias torques. (Author)
AD-657 764 HC$3.00 MF$0.65

EVALUATION OF TWO CYCLIC-STRAIN IMPACT ATTENUATORS.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 131.
AD-657 798 HC$3.00 MF$0.65

THE NATURAL ENVIRONMENT OF A SATELLITE IN A SYNCHRONOUS CIRCULAR ORBIT.
Weather Wing (6th) Andrews AFB Washington D C
For primary bibliographic entry see Field 22C.
AD-658 014 HC$3.00 MF$0.65

IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS.
Monsanto Research Corp Dayton Ohio Dayton Lab
For primary bibliographic entry see Field 6K.
AD-658 203 HC$3.00 MF$0.65

EVALUATION OF LATERAL-DIRECTIONAL HANDLING QUALITIES OF PILOTED RE-ENTRY VEHICLES UTILIZING FIXED-BASE IN-FLIGHT EVALUATIONS.
Contractor rept.,
Cornell Aeronautical Lab Inc Buffalo N Y
J. I. Meeker. May 67, 191p
NASA-CR-778
Contracts NASA-E-20812, AF 33 (615)-1253

Descriptors: (*Lifting reentry vehicles, Flight control systems), (*Flight control systems, Flight testing), Simulation, Handling, Configuration, Atmosphere entry, Dynamics.
Identifiers: Evaluation.

Three different groups of lateral-directional flight characteristics were investigated and the results are presented in three parts. Part I evaluation configurations were selected from a previous re-entry vehicle evaluation program; Part II configurations were based on a general lateral-directional handling qualities investigation; and Part III configurations were directly applicable to lifting body investigations. All of the configurations were evaluated for their suitability to the re-entry mission. The vehicle used for both the fixed-base and in-flight simulations was a three-axis variable stability T-33 airplane. (Author)
AD-658 211 HC$3.00 MF$0.65

THE TRANSIT DOPPLER TRACKING STATION DIGITAL SYSTEM: A SUMMARY,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 17C.
AD-658 375 HC$3.00 MF$0.65

DESIGN OF A MECHANICAL DAMPER FOR A GRAVITY-STABILIZED SATELLITE,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
F. F. Mobley. 17 Mar 61, 31p Rept no. CF-2924
Contract NOrd-7386

Descriptors: (*Satellites (Artificial), *Stabilization systems), Damping, Design, Perturbation theory, Dynamics, Equations of motion.

A theory of optimum tuned damper design is applied to a damper for a gravitationally stabilized satellite. For nominal satellite weighing 100 lbs., a 1.2 lbs damper developes 0.5 per cent of critical damping; oscillations damp to 1/e of their initial amplitude in 1.3 days. A small perturbation analysis of satellite angular motions indicates that this damper would be most efficient in a satellite with cigar-like mass distribution. (Author)
AD-658 388 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME VII - ATTITUDE CONTROL DURING LAUNCH.
General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Jul 67, 134p NASA-CR-826, GDC-DDE66-028
Contract NAS8-11494

Descriptors: *Attitude control, *Autopilot, *Control system, *Space vehicle control, Analysis, Approximation, Attitude, Computer, Control, Design, Dynamics, Effect, Equation, Function, Launch, Nonlinear, Period, Short, Simulation, Space, Stabilization, System, Transfer, Vehicle.

For abstract, see STAR 05 20.
N67-34031 HC$3.00 MF$0.65

A TREATISE ON THE SURVEYOR LUNAR LANDING DYNAMICS AND AN EVALUATION OF PERTINENT TELEMETRY DATA RETURNED BY SURVEYOR I.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
J. Garba, and F. Sperling. 15 Aug 67, 31p NASA-CR-87421, JPL-TR-32-103
Contract NAS7-100

Descriptors: *Landing system, *Lunar landing, *Surveyor spacecraft, Analysis, Data, Dynamics, Gear, Landing, Lunar, Material, Soil, Spacecraft, Surface, Surveyor i spacecraft, Surveyor ii spacecraft, System, Telemetry.

For abstract, see STAR 05 20.
N67-34177 HC$3.00 MF$0.65

QUALIFICATION EVALUATION OF THE PITCH CONTROL MOTOR FOR THE LAUNCH ESCAPE SYSTEM OF THE APOLLO SPACECRAFT PROGRAM.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
P. E. Cota, Jr., and B. J. Lee. Aug 67, 104p
NASA-TN-D-4068
Contract 914-11-10-00-72

Descriptors: *Apollo spacecraft, *Environmental testing, *Escape rocket, *Pitch controller, *Static firing, Aging, Controller, Environment, Escape, Firing, Launch, Motor, Pitch, Propellant, Qualification, Rocket, Specification, Static, Temperature, Testing, Vibration.

For abstract, see STAR 05 20.
N67-34212 HC$3.00 MF$0.65

EVALUATION OF AN ION PROPULSION SYSTEM FOR A SYNCHRONOUS SPACECRAFT MISSION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 21C.
For abstract, see STAR 05 20.
N67-34242 HC$3.00 MF$0.65

PHASE DIFFERENCE NAVIGATION SATELLITE STUDY INTERIM SCIENTIFIC REPORT.
Radio Corp. of America, Moorestown, N. J.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 05 20.
N67-34257 HC$3.00 MF$0.65

ON THE APPLICATION OF ELECTRIC PROPULSION TO SATELLITE ORBIT ADJUSTMENT AND STATION KEEPING.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 21C.
For abstract, see STAR 05 20.
N67-34300 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME XIII - ADAPTIVE CONTROL.
General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Aug 67, 80p NASA-CR-832, GD/C-DDE67-002
Contract NAS8-11494

Descriptors: *Adaptive control system, *Flight control, *Mathematical model, Adaptive, Analysis, Characteristics, Control, Design, Filter, Flight, Identification, Mathematics, Model, Response, Space vehicle, Spectral, System, Tracking.

For abstract, see STAR 05 20.
N67-34411 HC$3.00 MF$0.65

NIMBUS METEOROLOGICAL SATELLITE INTEGRATION AND TESTING MATERIALS REPORT NO. 8.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
T. Neville. Jul 65, 53p NASA-CR-87481, DOC.-65SD4410
Contracts NAS5-978, NAS5-1347

Descriptors: *Failure, *Material testing, *Nimbus satellite, *Quality control, Analysis, Array, Component, Contamination, Control, Drive, Environment, Infrared, Integration, Lubricant, Material, Outgassing, Quality, Rubber, Solar, Stimulation, Testing, Wire.

For abstract, see STAR 05 20.
N67-34431 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEM. VOLUME XIV - LOAD RELIEF.
General Dynamics Corp., San Diego, Calif.
R. D. Harris. Aug 67, 84p NASA-CR-833, GD/C-DDE67-003
Contract NAS8-11494

Descriptors: *Aerodynamic load, *Autopilot, *Space vehicle control, *Stability and control, Aerodynamic, Analysis, Constraint, Control, Design, Dispersion, Flight, Law, Load, Relief, Space, Stability, Trajectory, Vehicle.

For abstract, see STAR 05 20.
N67-34452 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME III - LINEAR SYSTEMS.
General Dynamics Corp., San Diego, Calif.
A. L. Greensite. Jul 67, 228p NASA-CR-822
Contract NAS8-11494

Descriptors: *Flight control, *Linear system, *Space vehicle control, Analysis, Compensation, Continuous, Control, Controllability, Data, Design, Flight, Invariance, Linear, Observation, Principle, Sample, Space, Stability, State, System, Technique, Variable, Vehicle.

For abstract, see STAR 05 20.
N67-34453 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME XV - ELASTIC BODY EQUATIONS.

General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Aug 67, 109p NASA-CR-834, GD/C-DDE65-025
Contract NAS8-11494

Descriptors: *Control system, *Elastic body, *Flight control, *Motion equation, *Space vehicle control, Analysis, Autopilot, Beam, Body, Control, Design, Elastic, Equation, Flight, Forced, Free, Inertia, Lateral, Launch vehicle, Method, Mode, Motion, Natural, Nonuniform, Numerical, Orthogonal, Property, Rotary, Shear, Space vehicle, System, Uniform, Vacuum, Vibration.

For abstract, see STAR 05 20.
N67-34545 HC$3.00 MF$0.65

CAPACITANCE PROPELLANT GAGING STUDY FOR ORBITING SPACECRAFT FINAL DEVELOPMENT REPORT.
Trans-sonics, Inc., Burlington, Mass.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 20.
N67-34606 HC$3.00 MF$0.65

HANDBOOK OF OPTICAL PROPERTIES FOR THERMAL CONTROL SURFACES, VOLUME III FINAL REPORT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 20.
N67-34625 HC$3.00 MF$0.65

ANALYTICAL STUDY OF EQUIPMENTS.
Etude Analytique des Equipements
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 66p DTA-50-4644, APPEND. II
in French Prepared for Eldo

Descriptors: *Eldo launch vehicle, *Functional analysis, Analysis, Cell, Command, Control, Detector, Equipment, Functional, Guidance, Infrared, Launch, Performance, Power, Radio, Satellite, Solar, Supply, Telecommunication, Telemetry, Vehicle.

For abstract, see STAR 05 20.
N67-34795 HC$3.00 MF$0.65

DEVELOPMENT OF VISUAL, CONTACT AND DECISION SUBSYSTEMS FOR A MARS ROVER, JULY 1966 - JANUARY 1967.
Massachusetts Inst. of Tech., Cambridge. Instrumentation Lab.
J. G. Bever, W. L. Kilmer, W. S. Mc Culloch, R. Moreno-diaz, and L. L. Sutro. Jul 67, 112p
NASA-CR-87503, R-565
Contracts NSR-22-009-138, NGR-22-009-140

Descriptors: *Decision making, *Mars surface, *Surface vehicle, *Tactile discrimination, *Visual system, Animal, Camera, Computer, Contact, Control, Data, Decision, Discrimination, Instrumentation, Learning, Mars (planet), Model, Processing, Robot, Roving, Sensory, Surface, System, Tactile, Vehicle, Visual.

For abstract, see STAR 05 20.
N67-34834 HC$3.00 MF$0.65

A LINEARIZED ERROR ANALYSIS OF ONBOARD PRIMARY NAVIGATION SYSTEMS FOR THE APOLLO LUNAR MODULE.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
R. H. Kidd, III, A. G. Reinhold, and J. H. Suddath. Aug 67, 26p NASA-TN-D-4027

Descriptors: *Lunar excursion module (lem), *Navigation system, *Onboard navigation, Accuracy, Analysis, Comparison, Concentric, Error, Flight, Information, Linear, Measurement, Navigation, Optical, Phase, Plan, Primary, Radar, Rendezvous, Sampling, Sensor, Source, System, Time, Tracker.

For abstract, see STAR 05 20.
N67-34897 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME IV - NONLINEAR SYSTEMS.
General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Jul 67, 179p NASA-CR-823, GD/C-DDE65-056
Contract NAS8-11494

Descriptors: *Flight control, *Nonlinear system, *Space vehicle control, Analysis, Control, Controller, Design, Flight, Function, Liapunov function, Linear, Nonlinear, On-off, Phase, Plane, Space, Stability, System, Theory, Transfer, Vehicle.

For abstract, see STAR 05 20.
N67-34940 HC$3.00 MF$0.65

HIGHLY ECCENTRIC ORBITING SATELLITE.
Der Heos-a Satellit
Junkers Flugzeug- Und Motorenwerke A. G., Munich (West Germany).
G. Scheil. 1966, 9p REPT.-66-124
Presented At the Dgrr-symp. Satelliten-technik Ii, Munich, 8 Dec. 1966

Descriptors: *European space program, *Interplanetary magnetic field, *Orbiting satellite, *Satellite design, Communication, Control, Design, Europe, Experiment, Field, Interplanetary, Magnetic, Mission, Orbit, Program, Satellite, Space, Stability, System, Thermal, West germany.

For abstract, see STAR 05 20.
N67-34983 HC$3.00 MF$0.65

STUDY PROGRAM ON (30-100 G HZ) ELECTRONICALLY STEERABLE ANTENNA SYSTEMS QUARTERLY REPORT, 20 SEP. 1966 - 20 JAN. 1967.
Advanced Technology Corp., Timonium, Md.
20 Jan 67, 76p NASA-CR-88509, QR-2
Contract NAS5-10256

Descriptors: *Satellite guidance, *Steerable antenna, Antenna, Aperture, Capability, Distribution, Electronic, Element, Feed, Generator, Guidance, Horn, Multiplier, Phase, Satellite, Shift, Steering, System, Waveguide.

For abstract, see STAR 05 20.
N67-34998 HC$3.00 MF$0.65

AERODYNAMIC EFFECTS OF BULBOUS BASES.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 20.
N67-35011 HC$3.00 MF$0.65

STUDY OF CERAMIC HEAT SHIELDS FOR LIFTING REENTRY VEHICLES.
Bell Aerosystems Co., Buffalo, N. Y.
J. N. Krusos. Aug 67, 99p NASA-CR-861
Contract NAS1-5370

Descriptors: *Ceramics, *Heat shield, *Lifting reentry, *Reentry vehicle, Ablation, Brittleness, Design, Elasticity, Heat, Heat transfer, High pressure, Inspection, Lifting, Load, Manned, Manufacture, Mechanical, Modulus, Optimization, Porosity, Radiation, Reentry, Rupture, Shield, Shock, Structure, Test, Thermal, Trajectory, Vehicle.

For abstract, see STAR 05 20.
N67-35013 HC$3.00 MF$0.65

TRANSIENT THERMAL BEHAVIOR OF SIMPLE STRUCTURES IN A SIMULATED SPACE ENVIRONMENT BY MODEL TESTING.
Illinois Univ., Urbana. Engineering Experiment Station.
B. T. Chao, J. S. De Paiva, and M. N. Huang. Jul 67, 84p NASA-CR-87447, ME-TR-NGR-048
Contract NGR-14-005-048

Descriptors: *Space environment, *Spacecraft model, *Thermal effect, Chamber, Criterion, Effect, Environment, Heat, Model, Performance, Scale, Simulation, Space, Spacecraft, Structure, Test, Thermal, Thermocouple, Transfer, Transient.

For abstract, see STAR 05 20.
N67-35262 HC$3.00 MF$0.65

ANALYSIS OF PRESSURE MEASUREMENTS TAKEN AT ALTITUDES BETWEEN 30 AND 90 KM BY CONE-CYLINDER PITOT-STATIC PROBES,
Sandia Corp., Albuquerque, N. Mex.
D. J. Rigali, and K. J. Touryan. Jun 67, 37p
Contract AT (29-1 (-789

Descriptors: (*Sounding rockets, *Altitude), (*Pitot tubes, *High altitude), (*Probes, *Rocket trajectories), Guided missiles, Rockets.

For abstract, see NSA 21 17.
SC-RR-67-251 HC$3.00 MF$0.65

22C. Spacecraft Trajectories and Reentry

A STATISTICAL ANALYSIS OF YAW STEERING FOR SPACE MISSIONS,
Aerospace Corp El Segundo Calif El Segundo Technical Operations
For primary bibliographic entry see Field 17G.
AD-657 769 HC$3.00 MF$0.65

OBSERVATION SYSTEM BIAS ESTIMATION FROM SATELLITE OBSERVATIONS: DIGITAL COMPUTER PROGRAM.
Final rept. (Vol. 2), 1 Jun 66-31 May 67,
Martin Co Baltimore Md
Karlis Minka, Jacques Fein, and Bruce E. Clemerz. Aug 67, 109p Rept no. Engineering-1462-7-2 AFCRL-67-0439
Contract AF 19 (628)-4167

Descriptors: (*Orbital trajectories, *Computer programs), Mathematical models, Flow charting, Subroutines, Satellite tracking systems, Analysis of variance.
Identifiers: FORTRAN IV.

This program is based on the analytical work contained in Report AD-625 453 in addition, more details about the filtering equations concerning the bias estimation are reported in the appendix of this report. The general features, development, inputs and modes of operation of the program are discussed. In addition, a sample estimation of observation and station location biases is presented. Operating instructions and input/output descriptions and definitions are provided. All symbols used in the program are listed and defined in conjunction with Report AD-637 206. All additional or modified flow charts and subroutines which are not included in AD-637 206 are presented. The program is written in FORTRAN IV and machine language (MAP). Double precision is used extensively. Revisions and modifications of the program

reported in AD-637 206 are reported in the appendix.
AD-657 811 HC$3.00 MF$0.65

THE NATURAL ENVIRONMENT OF A SATELLITE IN A SYNCHRONOUS CIRCULAR ORBIT.
Technical rept.,
Weather Wing (6th) Andrews AFB Washington D C
Henry W. Brandli. Jun 67, 62p Rept no. TR-192

Descriptors: (*Satellites (Artificial), Circular orbit trajectories), (*Circular orbit trajectories, Environment), Thermodynamics, Electromagnetic properties, Meteorites, Cosmic rays, Solar spectrum, Terrestrial magnetism, Magnetic fields, Solar radiation, Solar flares, Neutrons, Solar wind, Spacecraft, Upper atmosphere, Temperature, Barometric pressure.

The current literature is reviewed and the natural environment at about 6.6 earth radii (from the center of the earth) is defined in terms of the thermodynamic variables, the geophysical variables, the electromagnetic radiation environment, the particle radiation environment, and the meteoroid environment. (Author)
AD-658 014 HC$3.00 MF$0.65

A NEW INTEGRAL IN THE RESTRICTED PROBLEM,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
C. L. Goudas. Apr 67, 27p Rept no. D1-82-0635, Mathematical note-523

Descriptors: (*N-body problem, Mathematical analysis), Hamiltonian, Equations of motion, Motion, Circular orbit trajectories, Periodic variations.

Extensive numerical experiments involving integration of a few thousand periodic and non-periodic solutions of the planar restricted problem of three bodies indicate that the recently given new integral of the restricted problem defines the same hypersurface as the Hamiltonian, and as a result it is not an independent integral. (Author)
AD-658 163 HC$3.00 MF$0.65

NONGRAY RADIATIVE TRANSFER EFFECTS ON THE RADIATING STAGNATION REGION SHOCK LAYER AND STAGNATION POINT HEAT TRANSFER,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20D.
AD-658 321 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD. MATHEMATICS, MECHANICS AND ASTRONOMY SERIES, VOL. 19, NO. 1, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-658 392 HC$3.00 MF$0.65

THERMAL BEHAVIOR OF SNAP 8 REACTOR DURING ATMOSPHERIC REENTRY,
Atomics International, Canoga Park, Calif.
L. D. Montgomery, J. E. Aenold, and E. M. Mouradian. 1 May 67, 66p
Contract AT (04-3)-701

Descriptors: (*Atmosphere entry, *Auxiliary power plants), (*Aerodynamic heating, Predictions), Reactor cores, Computer programs, Angle of attack.

For abstract, see NSA 21 17.
NAA-SR-12355 HC$3.00 MF$0.65

SNAP 8 CONFIGURATION REENTRY HYPERSONIC HEATING RATES DERIVED FROM A SHOCK TUNNEL TEST,
Atomics International, Canoga Park, Calif.
D. K. Nelson. 1 May 67, 30p
Contract AT (04-3)-701

Descriptors: (*Heat transfer, *Angle of attack), (*Aerodynamic heating, *Stagnation point), Sensors, Perturbation theory, Hypersonic flow, Atmosphere entry.

For abstract, see NSA 21 17.
NAA-SR-12383 HC$3.00 MF$0.65

NUMERICAL METHOD FOR ROCKET TRAJECTORY DETERMINATION FROM MULTISTATION DOPPLER TRACKING DATA.
Tuab Teleutredningar A.B., Solna (Sweden). Space Technology Group.
J. Martin-loef. Apr 67, 30p REPT.-67-K3
Sponsored By Nasa and Swed. Space Res. Comm.

Descriptors: *Polystation doppler (polydop) tracking system p, *Sounding rocket, *Trajectory analysis, Analysis, Computation, Computer, Coordinate, Data, Fortran, Ground, Ionosphere, Iteration, Matrix, Numerical, Optimization, Program, Radar, Recovery, Rocket, Signal, Sounding, Station, System, Tracking, Trajectory, Transmission, Troposphere.

For abstract, see STAR 05 20.
N67-34215 HC$3.00 MF$0.65

SOUND RANGING COMPUTATIONS FOR SOUNDING ROCKET RECOVERY.
Tuab Teleutredningar A.B., Solna (Sweden). Space Technology Group.
J. Martin-loef. Apr 67, 21p REPT.-67-K2
Sponsored By Nasa and Swed. Space Res. Comm.

Descriptors: *Recovery, *Shock wave, *Sounding rocket, Acoustic, Algol, Atmosphere, Computation, Data, Earth, Incidence, Interpolation, Iteration, Least, Matrix, Method, Microphone, Plane, Program, Ranging, Rocket, Sounding, Square, Transmission, Wave.

For abstract, see STAR 05 20.
N67-34216 HC$3.00 MF$0.65

THE ACCESSIBLE REGIONS PRESENTATION OF GRAVITY-ASSISTED TRAJECTORIES USING JUPITER.
IIT Research Inst., Chicago, Ill.
D. A. Klopp, and J. C. Niehoff. Jun 67, 45p
NASA-CR-87495, T-18
Contract NASR-65/06/

Descriptors: *Jupiter (planet), *Planetary gravitation, *Space exploration, *Spacecraft trajectory, Access, Assist, Capability, Ecliptic, Energy, Exploration, Gravity, Heliocentricity, Latitude, Launch, Maneuver, Parameter, Plane, Planetary, Radius, Solar system, Space, Space flight, Spacecraft, Time, Trajectory.

For abstract, see STAR 05 20.
N67-34604 HC$3.00 MF$0.65

NASA SYMPOSIUM ON TRAJECTORY ESTIMATION.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
9 Dec 66, 35p NASA-TM-X-60226
Symp. Held 18-19 Oct. 1966

Descriptors: *Conference, *Orbit calculation, *Trajectory analysis, Abstract, Analysis, Calculation, Comet, Constraint, Data, Error, Estimation, Filter, Force, Mathematics, Model, Navigation, Orbit, Processing, Random, Satellite, Sequence, Spacecraft, State, Stochastic, Tolerance, Tracking, Trajectory, Variance.

For abstract, see STAR 05 20.
N67-34627 HC$3.00 MF$0.65

THE SEPARATE COMPUTATION OF ARCS FOR OPTIMAL FLIGHT PATHS WITH STATE VARIABLE INEQUALITY CONSTRAINTS.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
A. E. Bryson, Jr., R. K. Mehra, and J. L. Speyer. May 67, 37p NASA-CR-87510, TR-526
Contracts NGR-22-007-068, NONR-1866/16/

Descriptors: *Flight path, *Inequality (math), *Optimization, *State equation, Arc, Computation, Equation, Flight, Optimal, Path, State, Trajectory, Variable.

For abstract, see STAR 05 20.
N67-34715 HC$3.00 MF$0.65

A NEIGHBORING OPTIMUM FEEDBACK CONTROL SCHEME BASED ON ESTIMATED TIME-TO-GO WITH APPLICATION TO RE-ENTRY FLIGHT PATHS.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
A. E. Bryson, Jr., and J. L. Speyer. Jun 67, 51p
NASA-CR-87501, TR-527
Contracts NGR-22-007-068, NONR-1866/16/

Descriptors: *Feedback control system, *Flight path, *Reentry trajectory, Control, Error, Feedback, Flight, Glider, Path, Perturbation, Reentry, System, Trajectory, Vehicle.

For abstract, see STAR 05 20.
N67-34936 HC$3.00 MF$0.65

AERODYNAMIC EFFECTS OF BULBOUS BASES.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
L. E. Ericsson. Jun 67, 63p NASA-CR-66434, LMSC-4-17-67-3
Contract NAS1-6450

Descriptors: *Dynamic response, *Reentry vehicle, *Separated flow, *Spacecraft configuration, Blunt, Bulb, Configuration, Dynamic, Effect, Flow, Interference, Reentry, Response, Separation, Slender, Spacecraft, Stability, Static, Sting.

For abstract, see STAR 05 20.
N67-35011 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME IX - OPTIMIZATION METHODS.
General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Jul 67, 189p NASA-CR-828, GDC-DDE66-026
Contract NAS8-11494
Refs

Descriptors: *Dynamic programming, *Maximum principle, *Optimal control, *Space vehicle control, *Variational calculus, Calculus, Control, Dynamic, Gradient, Landing, Linear, Lunar, Maximum, Method, Optimal, Orbit, Principle, Problem, Programming, Reentry, Soft, Solution, Space, Theory, Trajectory, Variation, Vehicle.

For abstract, see STAR 05 20.
N67-35169 HC$3.00 MF$0.65

SYNTHESIS OF THE ANALYTICAL RESULTS OF OPTIMAL TRANSFERS BETWEEN KEPLERIAN ORBITS (TIME-FREE CASE).
Synthese des Resultats Analytiques Sur les Transferts Optimaux Entre Orbites Keplerienes (Duree Indifferente)
France. Office National D Etudes Et de Re-

cherches Aerospatiales, Chatillon-sous-bagneux. C. Marchal. 1967, 35p ONERA-TP-482/1967/ in French, English Summary Presented At the Colloq. on Advan. Probl. and Methods for Space Flight Optimization, Liege, 13-23 Jun. 1967

Descriptors: *Kepler law, *Optimization, *Orbital transfer, *Transfer orbit, Analysis, Boundary, Condition, Ellipse, Free, Hyperbola, Impulse, Orbit, Time, Trajectory, Transfer.

For abstract, see STAR 05 20.
N67-35177 HC$3.00 MF$0.65

DIFFERENTIAL CORRECTIONS APPLIED TO VINTI'S ACCURATE REFERENCE SATELLITE ORBIT WITH INCLUSION OF THE THIRD ZONAL HARMONIC.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. Walden, and S. Watson. Aug 67, 49p NASA-TN-D-4088
Contract 311-07-01-01-51

Descriptors: *Differential equation, *Planetary gravitation, *Satellite orbit, *Vinti theory, Coefficient, Correction, Derivative, Differential, Equation, Gravity, Harmonic, Improvement, Method, Orbit, Planetary, Satellite, Spheroid, Theory, Third, Time, Zone.

For abstract, see STAR 05 20.
N67-35224 HC$3.00 MF$0.65

FAST INTERPLANETARY MISSIONS WITH LOW-THRUST PROPULSION SYSTEMS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
W. E. Moeckel. 1961, 34p NASA-TR-R-79
N62-70503

Descriptors: (*Interplanetary trajectories, Time), (*Transfer trajectories, Interplanetary trajectories), Space propulsion, Spacecraft nuclear propulsion, Electric propulsion, Weight, Thrust.

A simple family of indirect transfer trajectories between circular orbits is used to evaluate the mass ratio required to complete round-trip interplanetary missions using low-thrust propulsion systems. The results indicate that indirect interplanetary trajectories yield substantial reductions in total round-trip time for low-thrust as well as high-thrust vehicles, and that space vehicles propelled with electric rockets may produce greater reductions in trip time, for a given initial weight, than those propelled by high-thrust nuclear rockets. (Author)
PB-175 735 HC$3.00 MF$0.65

TRAJECTORIES WITH CONSTANT TANGENTIAL THRUST IN CENTRAL GRAVITATIONAL FIELDS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
W. E. Moeckel. 1960, 77p NASA-TR-R-53

Descriptors: (*Interplanetary trajectories, Thrust), Gravity, Space propulsion, Equations of motion, Graphics, Weight, Time.

Trajectories followed by vehicles propelled by a constant thrust directed parallel to the velocity were calculated in nondimensional form for a range of initial thrust-weight ratios from 10 to 0.0001 and for a range of jet velocities from those attainable with chemical rockets to infinity. Trajectories are presented both for the departure outward from, and the inward return to, any circular orbit. Results are given in the form of curves of radial distance, energy per unit mass (hyperbolic velocity), trajectory inclination, and velocity and angular distance as functions of time. Utilization of these charts to estimate weight requirements for interplanetary missions is discussed. (Author)
PB-175 736 HC$3.00 MF$0.65

NEARLY CIRCULAR TRANSFER TRAJECTORIES FOR DESCENDING SATELLITES.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
George M. Low. 7 Oct 58, 18p NASA-TR-R-3
AD-229 008

Descriptors: (*Transfer trajectories, Satellites (Artificial)), Elliptical orbit trajectories, Circular orbit trajectories, Descent trajectories, Equations of motion, Mathematical analysis.

Simplified expressions describing the transfer from a satellite orbit to the point of atmospheric entry are derived. The expressions are limited to altitude changes that are small compared with the earth's radius, and velocity changes small compared with satellite velocity. They are further restricted to motion about a spherical, nonrotating earth. The transfer orbit resulting from the application of thrust in any direction at any point in an elliptic orbit is considered. Expressions for the errors in distance (miss distance) and entry angle due to an initial misalinement and magnitude error of the deflecting thrust are presented. The guidance and accuracy requirements to establish a circular orbit, in addition to the corrections applied to transform elliptic orbits into circular ones, are also discussed.
PB-175 823 HC$3.00 MF$0.65

THE EFFECT OF LIFT ON ENTRY CORRIDOR DEPTH AND GUIDANCE REQUIREMENTS FOR THE RETURN LUNAR FLIGHT.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 17G.
PB-175 885 HC$3.00 MF$0.65

A THEORETICAL STUDY OF THE ANGULAR MOTIONS OF SPINNING BODIES IN SPACE.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Jerrold H. Suddath. 21 Jun 60, 14p NASA-TR-R-83
AD-245 405, N62-70507

Descriptors: (*Spacecraft, *Equations of motion), Theory, Spin stabilization, Motion, Moments, Damping.

Euler's dynamic equations were linearized and solved analytically. Analytical expressions which relate angular motions to spin-rate and inertia distributions were obtained and found to be in good agreement with machine solutions of the nonlinear equations for the case of a rectangular-pulse pitching-moment disturbance. Consideration was given to the effects produced by having artificial damping in the system. (Author)
PB-175 888 HC$3.00 MF$0.65

TRAJECTORY CONTROL FOR VEHICLES ENTERING THE EARTH'S ATMOSPHERE AT SMALL FLIGHT-PATH ANGLES.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
John M. Eggleston, and John W. Young. 1961, 32p NASA-TR-R-89
N62-70513

Descriptors: (*Atmosphere entry, Control), (*Descent trajectories, Control), Drag, Control systems, Aerodynamic heating, Heat transfer, Satellites (Artificial), Equations of motion, Mathematical analysis.

Methods of controlling the trajectories of high-drag--low-lift vehicles entering the earth's atmosphere at angles of attack near 90 degrees and at initial entry angles up to --3 degrees are studied. The trajectories are calculated for vehicles whose angle of attack can be held constant at some specified value or can be perfectly controlled as a function of some measured quantity along the trajectory. The results might be applied in the design of automatic control systems or in the design of instruments which will give the human pilot sufficient information to control his trajectory properly during an atmospheric entry.
PB-175 894 HC$3.00 MF$0.65

THEORY OF THE SECULAR VARIATIONS IN THE ORBIT OF A SATELLITE OF AN OBLATE PLANET.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
William A. Mersman. 2 Feb 61, 37p NASA-TR-R-99
AD-254 359, W62-70523

Descriptors: (*Orbital trajectories, Mathematical analysis), Hamiltonian, Perturbation theory, Periodic variations, Relativity theory, Numerical methods and procedures, Satellites (Artificial).

The theory of satellite orbits about an oblate planet is studied by means of a new set of canonical variables. The Hamiltonian function is separated into two parts, one of which is neglected. The neglected part is periodic with mean value equal to zero, and it vanishes when the inclination is zero. Thus the solution obtained by neglecting this part of the Hamiltonian is exact for equatorial orbits; for inclined orbits the secular motion of the node and perigee are obtained correctly to the second order in the oblateness parameter. A numerical example is included based on the satellite 1958 beta 2 (Vanguard 1). Secular motions are predicted accurately, and periodic motions within the limitations of the theory. Relativistic effects are shown to be negligible as far as the geometry of the orbit is concerned, while the secular drift of a satellite-borne clock is shown to be on the fringe of detectability.
PB-175 904 HC$3.00 MF$0.65

A STUDY OF THE BEHAVIOR OF SMALL SPHERES DURING REENTRY,
Aerotherm Corp., Palo Alto, Calif.
Raymond E. Lundberg, William C. Reynolds, and Roald A. Rindal. Jun 67, 99p

Descriptors: (*Spheres, *Fluid dynamic properties), (*Atmosphere entry, *Reentry vehicles), Aerodynamic heating, Deceleration.

For abstract, see NSA 21 18.
SC-CR-67-2635 HC$3.00 MF$0.65

22D. Spacecraft Launch Vehicles and Ground Support

PROBLEMS WITH ELECTRICAL CONNECTORS AND INSULATED WIRE IN THE AEROSPACE INDUSTRY,
General Electric Co., Daytona Beach, Fla. Apollo Support Dept.
For primary bibliographic entry see Field 9A.
AD-479 566 HC$3.00 MF$0.65

LAUNCH VEHICLE WIND AND TURBULENCE RESPONSE BY NONSTATIONARY STATISTICAL METHODS.
Hayes International Corp., Huntsville, Ala.
J. E. Bailey, J. L. Palmer, and R. E. Wheeler. Aug 67, 137p NASA-CR-846, REPT.-1340
Contract NAS8-20344

Descriptors: *Aerodynamic , load, *Algorithm, *Atmospheric turbulence, *Launch vehicle, *Statistical analysis, *Wind effect, Aerodynamic, Analysis, Atmospheric, Calculation, Effect, Load, Loading, Mathematics, Matrix, Model, Statistical, Turbulence, Wind.

For abstract, see STAR 05 20.
N67-34401 HC$3.00 MF$0.65

TRACKING REQUIREMENTS FOR A 24 HR. SATELLITE STATION KEEPING CONTROL SYSTEM.
European Space Vehicle Launcher Development Organization, Paris (France). Future Programs Directorate.
R. Cosaert. Nov 66, 26p ELDO-TM-F-38

Descriptors: *Synchronous satellite, *Tracking station, *Twenty-four hour satellite, Angle, Control, Diurnal, Drift, Elevation, Libration, Motion, Orbit, Satellite, Station, Stationary, Synchronous, Tracking, Variation.

For abstract, see STAR 05 20.
N67-34879 HC$3.00 MF$0.65

A COMPENDIUM OF NASA AEROBEE SOUNDING ROCKET LAUNCHINGS FOR 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. S. Bushnell, Jr., J. R. Busse, G. E. Kraft, and M. T. Leffler. Jul 67, 80p NASA-TN-D-3912

Descriptors: *Aerobee rocket, *Launching, Analysis, Data, Flight, Malfunction, Performance, Sounding, Subsystem, Tabulation, Vehicle.

For abstract, see STAR 05 20.
N67-34882 HC$3.00 MF$0.65

AEROELASTIC LOAD GROWTH EFFECTS ON SATURN CONFIGURATIONS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
J. G. Papadopoulos. 14 Jul 67, 39p NASA-TM-X-53634

Descriptors: *Aeroelasticity, *Load factor, *Saturn launch vehicle, *Steady state, Aerodynamic, Analysis, Angle, Attack, Bending, Comparison, External, Factor, Flight, Growth, Load, Local, Mathematics, Mode, State, Steady, Test.

For abstract, see STAR 05 20.
N67-35035 HC$3.00 MF$0.65

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